Wetland Management in the Settled Area of Alberta

Background for Policy Development

Alberta

WATER RESOURCES
COMMISSION

WETLAND MANAGEMENT IN THE SETTLED AREA OF ALBERTA

Background For Policy Development

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1.0 INTRODUCTION

Alberta is rich in natural resources for which most people recognize the value, such as petroleum, natural gas, agricultural land, timber and water resources. Unfortunately, many Albertans do not recognize the value of wetlands as a natural resource. Wetlands provide significant benefits including buffering of high runoff from spring snowmelt and summer storms, improvement of water quality, wildlife habitat, control of sedimentation and recharge of groundwater, as well as recreational and aesthetic enjoyment. For farmers, natural or managed wetlands may provide an on-farm water supply and enhancement of soil moisture, particularly where irrigation or backflooding is feasible. The benefits provided by wetlands should be recognized.

In the settled area of Alberta (see Figure 1), the traditional management approach to wetlands has been to convert them to other uses. Wetlands have been filled or drained to provide land for agriculture, urban development and road construction. The report, Drainage Potential in Alberta: An Integrated Study (Alberta Water Resources Commission 1987) concluded that continued drainage in the settled area would have significant negative effects on wetland resources. The study identified a variety of impacts of drainage including high costs, habitat loss, flooding and erosion problems. For example, the study estimated that drainage of all nonpermanent wetlands in the five northern river basins could result in a loss of 9.1 million ducks which represent 54 percent of the average provincial fall population of 16.8 million. Similar concerns about drainage are identified in other reports (e.g., Lynch-Stewart 1983, Andres et al. 1984, Brace and Pepper 1984, Turner et al. 1987). Interdisciplinary studies and programs have been initiated to address these concerns.

Responsibility for management of wetland resources in the settled area of Alberta is divided among several provincial government departments. Each of these departments administers policies and programs that directly or indirectly affect wetlands. Some government departments are funding drainage while others are funding wetland preservation. Activities of federal and municipal governments and nongovernment organizations also affect wetlands. Coordination, cooperation and communication are needed.

An integrated wetlands management policy for the settled area of Alberta is required to address the problem of wetland loss and provide consistent direction to government agencies that are responsible for management of wetland resources. The task of preparing a wetlands policy was assigned to an interdepartmental steering committee under the direction of the Alberta Water Resources Commission. The provincial departments of Agriculture, Environment, Forestry, Lands and Wildlife, Municipal Affairs, and Transportation and Utilities are represented on the committee.

This report contains background information that was considered during development of a draft wetlands policy. The report includes a discussion of the different types of wetlands and the value of wetland resources. Wetland management concerns and guiding principles are presented. Government legislation, policies and programs that affect wetlands are reviewed and evaluated as are activities of nongovernment organizations. Management objectives for wetland resources are provided and policies and programs in other jurisdictions are reviewed. Finally, this report examines wetland management policy options and makes recommendations for an integrated wetland policy for the settled area of Alberta. The draft policy in Section 8 of this report is available in a separate document that will be the subject of public review during the summer and fall of 1990.

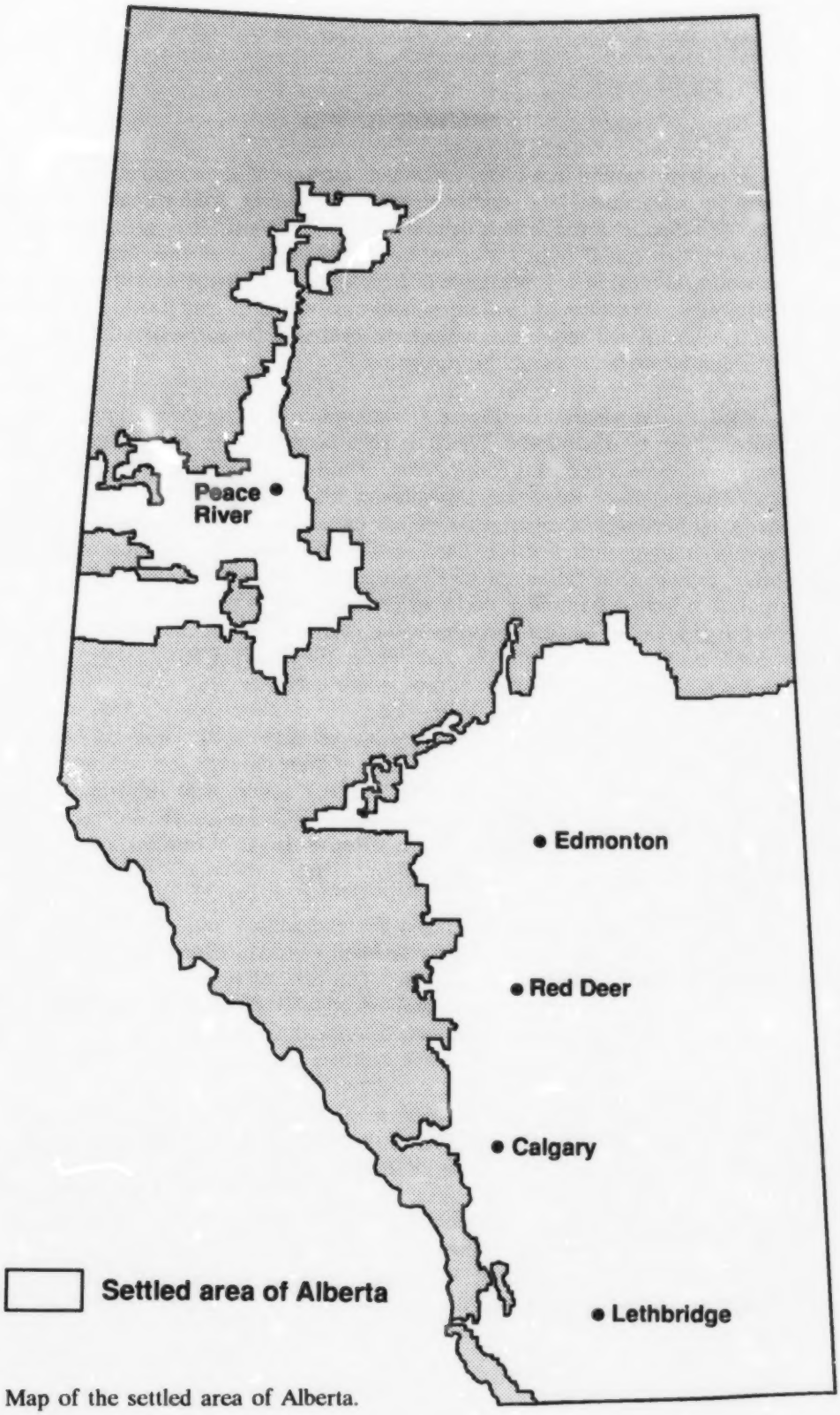

Figure 1. Map of the settled area of Alberta.

2.0 REVIEW OF EXISTING WETLAND RESOURCES

2.1 Wetland Inventory

The need for a comprehensive inventory of Alberta's wetlands was recognized in the early 1980s. An interdepartmental provincial government study was initiated in 1983 to identify the potential for drainage of agricultural lands in Alberta within a number of physical, environmental and economic constraints. The results of the study are summarized in the report Drainage Potential in Alberta: An Integrated Study (Alberta Water Resources Commission 1987). The wetlands classification system and results of the inventory are summarized below.

2.1.1 Classification of Wetland Types

The classification of wetland types in the Drainage Potential Study inventory is applicable in a broader context in Alberta. Wetlands are classified into the following seven categories on the basis of type and permanency:

Nonpermanent Wetlands

1. **Nonpermanent slough/marsh:** Wetland in a depression where surface drainage is obstructed, with less than 50 percent of the area as open water. Surface water is not always present; the area is usually dry for part of the growing season, especially in the late summer and fall.
2. **Sheetwater:** Areas of relatively flat, level terrain that are periodically inundated by shallow, open water that persists for short periods.
3. **Seep:** Wet areas resulting from groundwater discharge at the soil surface.

Permanent Wetlands

4. **Permanent slough/marsh:** Same description as for nonpermanent slough/marsh except that surface water is present year-round or climax vegetation is present.
5. **Lake/pond:** Permanent body of open water.
6. **Bog/fen:** Areas composed mainly of peat derived from moss or sedge and other organic materials. Surface water in bogs is acidic. Mosses, black spruce or tamarack and shrubs are present. Water in fens is slightly acidic to neutral in pH and rich in nutrients. Cover includes mosses, sedges, reeds, grasses and shrubs.
7. **Watercourse:** Channel for running water and adjacent floodplain.

More detailed explanations of the classification approach and categories may be found in the report by Intera Technologies (1985) and in the Drainage Potential Study. Some aspects of the classification system require further clarification. For example, what is a "short period" in the sheetwater category and how "permanent" are wetlands in the permanent category in comparison with permanent waterbodies under current application of the Public Lands Act (see Section 4.1.1.5).

2.1.2 Extent of Wetland Cover

The Drainage Potential Study found that wetlands cover 12.1 million acres (4.9 million hectares), or approximately 20 percent of the settled area of Alberta (Alberta Water Resources Commission 1987). The percentage of the land base occupied by wetlands in the settled area of Alberta generally increases from south to north (Figure 2). Bog/fen wetlands, the primary dominant type, represent 46 percent of all wetland areas in the settled area and occur almost exclusively in the north (Figure 3). The secondary dominant type, covering 28 percent of the wetland area, is nonpermanent slough/marsh wetlands, which are found primarily in central Alberta. Sheetwater and lake/pond wetlands are more prominent in northern than in southern and central Alberta.

Several factors must be considered when assessing the accuracy of the Drainage Potential Study inventory. The exceptional dryness of the study year and the previous year would have resulted in a low estimation of the total wetland area, particularly in the nonpermanent category. Lack of spring aerial photographic coverage decreased the estimate of sheetwater, since this wetland type generally occurs early in the year as a result of snowmelt and only after heavy rains later in the year. Comparison to an earlier study (Rapp et al. 1983) offers further evidence that the inventory may have underestimated wetland cover, particularly in central Alberta in the slough/marsh categories.

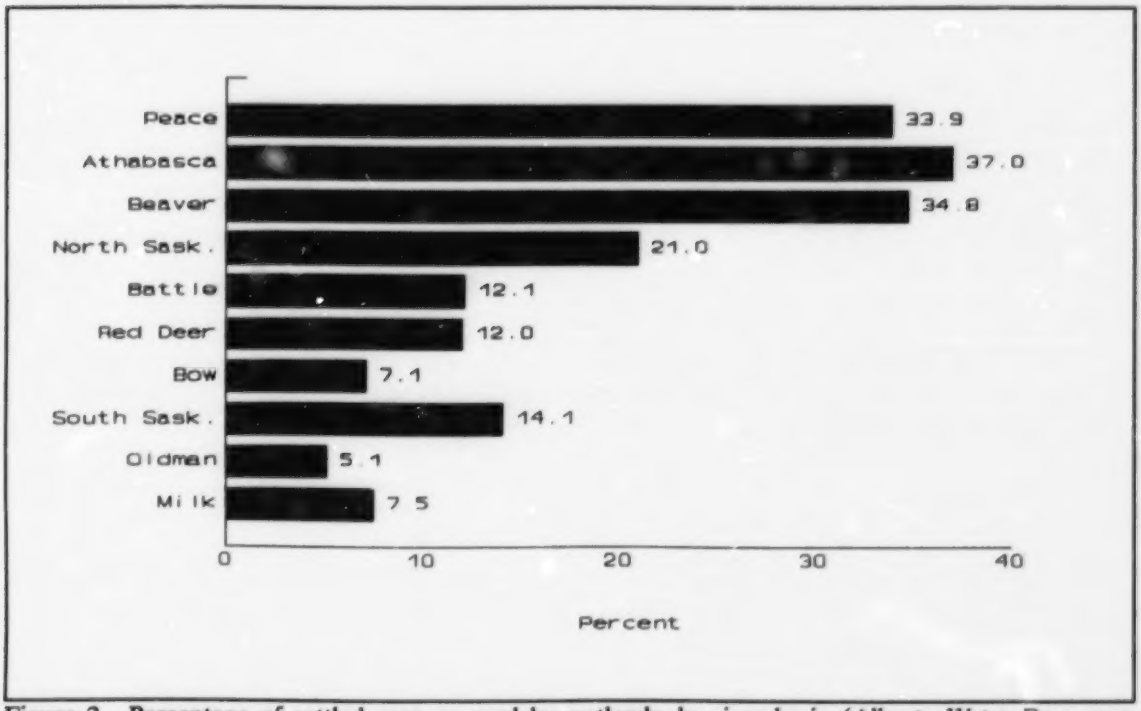

Figure 2. Percentage of settled area covered by wetlands, by river basin (Alberta Water Resources Commission 1987).

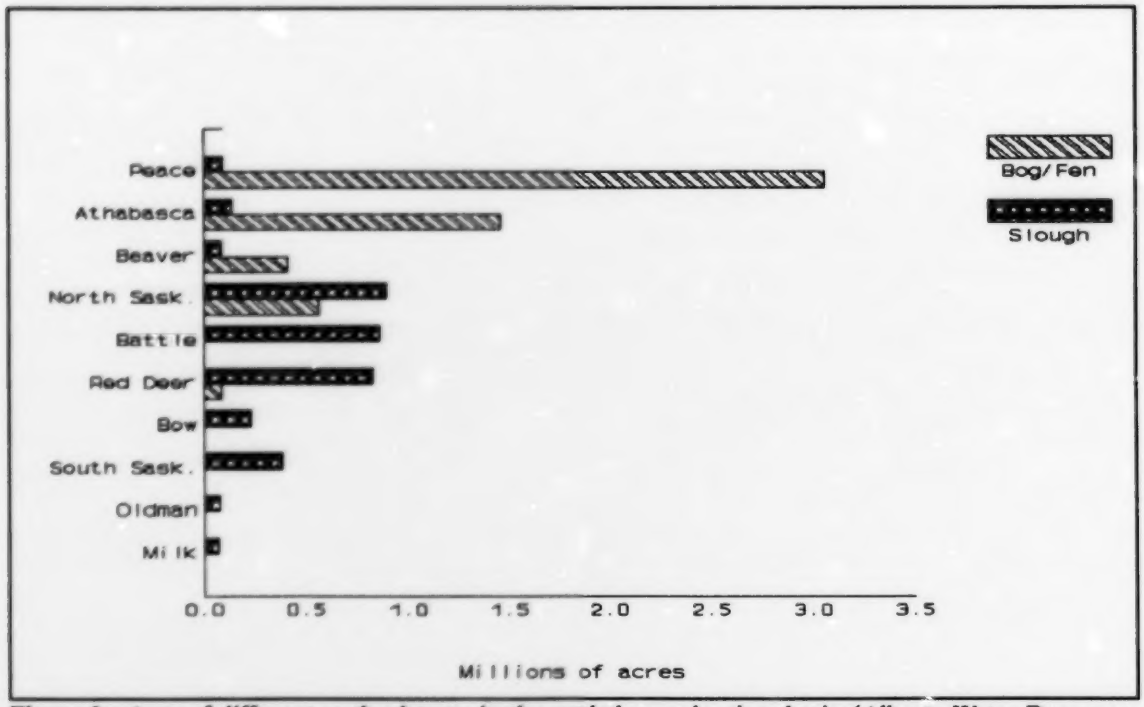

Figure 3. Area of different wetland types in the settled area, by river basin (Alberta Water Resources Commission 1987).

2.2 Wetland Loss

Wetlands in the settled area of Alberta have been disappearing steadily since settlement began. Schick (1972) found a 61 percent loss in wetland area in the aspen parkland region of Alberta between 1900 and 1972. Turner et al. (1987) found that during the period 1981 to 1985 an average of 66 percent of wetland basins and 93 percent of wetland margins in Alberta showed evidence of agricultural impacts. Studies by Goodman and Pryor (1972), Bellrose (1976), Schmitt (1980) and Lands Directorate (1986) have shown significant losses of wetlands in prairie Canada. Canadian Wildlife Service personnel estimate that between 1981 and 1989, 0.5 percent of Alberta's wetlands were lost each year to agricultural drainage (Turner 1990).

2.2.1 Factors Contributing to Wetland Loss

Wetlands are lost for a variety of reasons including agriculture, climatic fluctuations and urban, industrial and transportation development.

2.2.1.1 Agriculture

Drainage has benefits for agricultural producers and has been the primary cause of wetland loss. The Drainage Potential Study (Alberta Water Resources Commission 1987) showed that, if only on-farm costs are considered, landholders can realize positive financial gains from drainage in all parts of the province. Drainage, particularly of nonpermanent wetlands, is financially attractive to many

farmers provided they are not made liable for off-farm costs of flooding, erosion control and mitigation of wildlife habitat losses. Land can be brought into production and the efficiency and timing of field operations can often be improved. This in part explains the level of demand for drainage and is a motivating factor behind authorized and unauthorized drainage. In addition, society, through government program and policy direction and via direct and indirect subsidies, has encouraged drainage of wetlands. Potential benefits, such as increased food production, community development and expansion of the agricultural land base, were felt to outweigh the consequences of wetland loss. Many wetland values were either unknown or poorly understood at the time these programs and policies were developed. Local governments may see wetland drainage as a means for maintenance and enhancement of the property tax base and as a vehicle for economic development. Wetlands are also lost when irrigation of irrigation canals eliminates seepage areas.

Many factors make drainage attractive from the perspective of the landowner. Leitch (1989) outlined several factors which contribute to the desire to drain. These factors included expansion of cropland, pressure from lenders to increase cash flows, larger farm machinery that make it more difficult to manoeuvre around potholes, crop damage from wildlife, controlling hunters and weed problems. In addition, wetlands have been considered traditionally as impediments to farming and "good" farmers drain them. Neighbors may not approve of those who allow potholes to remain in their cropland and farmers want to avoid becoming stuck with their equipment in a wet area. Just as some feel that wetlands have heritage value, so do others feel that cropland has aesthetic and heritage value. It is often difficult for an individual farmer to accept that the small amount of drainage occurring on his or her land has an impact on a regional or provincial scale. Individual losses of wetlands may seem insignificant but they are the root of the wetland loss problem. Finally, acreage-based programs, such as the Canadian Wheat Board quota system and most crop insurance programs, and other support programs have encouraged producers to drain and cultivate wetlands. The quota system and crop insurance are currently under review (see Section 4.1.2.5).

Public funding of projects to mitigate erosion or flooding problems caused by upstream drainage can be seen as an indirect subsidy of wetland drainage. The Drainage Potential Study concluded that when all costs, including the cost of wildlife habitat replacement, are considered, drainage was uneconomic from a societal viewpoint. In the Peace, Athabasca and Beaver river basins drainage was found to be uneconomic even without considering habitat mitigation costs, because of the high costs of erosion control. The Sub-basin Water Management Planning Study (Alberta Environment 1988) found that off-farm drainage infrastructure costs were significant in northwestern Alberta. Individual landowners are rarely held responsible for all off-farm costs.

Generally, private individuals who contribute to the production of public benefits from wetlands such as water and wildlife are not paid by society (Goldstein 1971, Leitch 1989). Opportunities for landowners to profit directly from wetlands are limited even though the wetlands may be providing significant societal benefits. Private sector conservation organizations (e.g. Ducks Unlimited Canada) have successfully protected wetlands by providing financial compensation to individual landowners (Leitch 1989).

2.2.1.2 Climate

Natural climatic fluctuations also play a part in wetland loss. Successive dry years reduce wetland acreage both naturally and through increased agricultural activity. Most of these areas would return to wetland status as the climate swings into a wet cycle. However, there is often a strong desire

to drain them during subsequent wet years to maintain the land base and field efficiency achieved in drier years.

Increasing carbon dioxide concentrations in the atmosphere caused by such activities as burning fossil fuels and deforestation may cause an increase in global surface temperatures (Wittwer 1980, Arthur 1988). This phenomenon is known as the greenhouse effect. If this phenomenon intensifies in the long term, wetland area may be diminished as a result of increased evaporation or reduced precipitation.

2.2.1.3 Urban Expansion

Wetlands are lost as cities and towns expand onto adjacent areas (Elson 1989). Municipalities may drain wetlands to provide areas for development and eliminate breeding places for biting insects. By 1966, more than 75 percent of the original natural wetlands in the vicinity of Calgary and Edmonton had been lost to other land uses including agricultural and urban development (Lands Directorate 1986).

2.2.1.4 Transportation Development

Development of transportation routes has contributed to the loss of wetlands directly and through alteration of natural drainage patterns. Road allowances in the settled area of Alberta are laid out on a surveyed grid so that construction of roads on allowances often requires crossing of wetlands. The drainage infrastructure along roads often provides outlets for further drainage which may not be directly associated with roads. In some situations, filling a wetland may be the cheapest way to obtain a right-of-way for road construction.

2.2.1.5 Other Causes of Wetland Loss

Wetlands may be lost or damaged when horticultural peat is extracted from bogs and if drainage occurs to enhance timber production or allow petroleum and natural gas exploration and development. Wetlands may be degraded by solid waste disposal, water contamination, siltation, channelization and other types of pollution. The biological processes in wetland ecosystems may be destroyed if pollution levels are too high.

2.2.2 Impact of Wetland Loss

Much of the concern over wetland loss has focused on the loss of waterfowl habitat. Habitat loss and degradation are the major waterfowl management problems in North America (Environment Canada 1986). The Drainage Potential Study concluded that continuation of current authorized and unauthorized drainage will seriously affect wildlife habitat in Alberta. This could potentially cost the province millions of dollars in lost hunting and recreation related benefits. Decreased hunting activity would result in losses to hotel operators, equipment suppliers and other businesses. Fewer hunters also means fewer dollars available for sportsmen-supported habitat programs. A valuable part of Alberta wildlife heritage could be lost.

Negative effects of wetland loss are not confined to wildlife. Wetland values are described in Section 2.3. The loss of these benefits could have serious consequences for Alberta. Recent dry years combined with the possibility of a warmer, drier climate indicate a need to retain and manage surface water resources. Further loss of the recharge function of wetlands could threaten the ground-

water resource that is essential to many communities, industries and rural residents. The water purification function of wetlands should not be underestimated. Erosion and flooding problems resulting from drainage require expensive mitigation. The cost of erosion and flood control could exceed the ability of municipalities to pay. Finally, there are many aspects of wetlands that are not fully understood. The importance of some wetland values may not be fully understood until it is too late.

2.2.3 Marginal Value and Scarcity as Related to Wetland Loss

The concepts of scarcity and marginal value from the field of economics may be applied to wetland loss. As the number of wetlands decreases, the value of the remaining wetlands to society rises. The opposite would be true if the number of wetlands increases. Marginal value is particularly important to address when considering the differences in abundance and distribution of wetland types. For example, there are fewer slough/marsh wetlands and they are being drained at a greater rate than bog/fen wetlands (Green and Salter 1987). Therefore the marginal value of a slough/marsh wetland is greater. Wetlands may be more important in some areas than others. Wetland abundance, type, uses and therefore marginal value vary regionally throughout the province. The concept of marginal value may help determine the significance of a wetland for management purposes.

As more drainage occurs, undrained wetlands increase in marginal value to society. This could mean that a landowner who delayed the decision to drain may face societal pressure to preserve his or her wetlands even though or perhaps because neighbors drained their wetlands years before. This demonstrates the perceptual nature of societal values and the fact that they change over time.

2.3 The Value of Wetlands

Wetlands in the settled area of Alberta provide a continuous, sustainable stream of environmental, economic and social benefits that contribute greatly to the quality of life in the province. Many wetland uses can be measured in economic terms (Farber and Constanza 1987, Rubec et al 1988), while other significant benefits do not lend themselves to economic evaluation. For example, Albertans may value the existence of wetlands, though they never visit or directly benefit from them. Classification of wetland resource values is difficult and categories may overlap. Major categories of wetland resource values in alphabetical order are discussed below.

2.3.1 Agricultural Value

Wetlands may have significant agricultural value. The native grasses and sedges found in and around wetlands are high in protein and may be grazed or cut for hay. Backflooding in the spring, combined with subsequent controlled drawdowns, can increase hay yields. During dry years, forage production from wetlands may be a particularly valuable contribution to farm productivity. Yields can be as high or higher than other forages. Prairie wetlands are also valuable for reducing topsoil erosion, improving soil moisture and supplying water for livestock and domestic consumption (Baron and Nomsen 1988). Wetland vegetation can control the spread of salts into adjacent cropland (Morgan 1987b). Over 80 wild rice operations were located in permanent wetlands in the settled area of Alberta in 1989.

Wetlands are often seen as a hindrance to agricultural production. Benefits of drainage to agricultural producers include increases in land base, fewer weeds, earlier spring access and quicker

field access after storms. Tillage overlap is reduced and field pattern and working efficiency are improved, resulting in reduced input time and costs.

2.3.2 Ecological Value

The ecological value of wetlands is significant. They are dynamic, highly productive ecological systems that are an important source of genetic diversity. A wide variety of birds, mammals, amphibians, invertebrates and plants are produced in wetlands. Many wetland species are important links in complex food chains. Wetlands also contribute nutrients and energy to surrounding ecological systems. Significant or representative wetlands may have scientific or educational value. Beaverhill Lake, Wagner Bog and Cutpost Wetlands have been designated as natural areas. Some wetlands support rare or endangered plants or animals, such as Alberta's rarest native plant, the bog adder's-mouth orchid and the rare trumpeter swan.

2.3.3 Heritage Value

In Alberta, the pattern of settlement and fabric of rural life have been influenced strongly by wetlands. Wetlands are a special part of the landscape in the settled area of Alberta and heritage value exists in maintaining wetlands now and for the future. Beaverhill Lake is an Alberta wetland that has been recognized for its international heritage value under the Ramsar Convention (see Section 4.1.2.9).

2.3.4 Peat Resource Value

Wetlands are a source of peat that is used mainly for horticultural purposes. Most horticultural peat in Alberta is produced on public land in the settled area of the province. Peatlands also have potential for production of timber, peat for fuel and peat for industrial purposes such as absorbents. The peat industry in Alberta is in its infancy and increased demand for peat resources is expected.

2.3.5 Recreational and Tourism Value

Wetland-related recreation and tourism have substantial value to Alberta. A wide range of consumptive and non-consumptive recreational and tourism opportunities are dependent on wetlands. Hunting, cross-country skiing, skating, birdwatching, photography and enjoyment of the aesthetic and scenic values of wetlands are popular activities for Albertans and non-residents, alike. Numerous businesses provide goods and services (e.g., sportswear, equipment, travel, accommodation and gas) to people engaged in recreational use of wetlands resources. Development of Beaverhill Lake as a major tourist attraction has been proposed. The actual dollar value of wetland recreation may be estimated through analyses of travel cost or willingness to pay.

2.3.6 Water Resource (Hydrological) Value

Wetlands are important for the control and storage of surface water and the recharge and discharge of groundwater. Groundwater recharge in prairie regions takes place largely through the infiltration of water stored in sloughs that have bottom elevations higher than the water table (Andres et al. 1984). Hubbard and Linder (1986) contend that drainage of prairie slough/marsh wetlands will contribute to eventual declines in the water table over the long term. The specific relationships between wetlands and groundwater recharge are still uncertain. Wetlands in areas of groundwater discharge are associated with agricultural salinity problems in southern Alberta.

Hydrologic modelling has shown that wetland drainage can increase small watershed discharges (Campbell and Johnson 1975, Dybvig and Hart 1977). If the presence of wetlands reduces flood peaks, it may be inferred that uncontrolled drainage could increase susceptibility to flooding and water erosion problems. This has been the case in northwestern Alberta, where soils are particularly sensitive to erosion (Northern Alberta Development Council 1987).

Wetlands can modify the quality of the water that passes through them. During the growing season nutrients, pesticides and herbicides may be incorporated into wetland vegetation. This improves water quality and helps reduce the rate of eutrophication of downstream lakes and watercourses. Wetlands along stream systems significantly reduce the velocity of the water flowing through them which results in deposition of much of the sediment load (Andres et al. 1984). Managed wetlands have been successfully used for treatment of municipal sewage. In the town of Humboldt, Saskatchewan, an experimental wetlands wastewater treatment system was found to reduce phosphorus and nitrogen by more than 75 percent at a significantly reduced cost (Lackshman 1982). The Blue Quills School near St. Paul, Alberta has used a nearby wetland for wastewater treatment successfully for over 40 years (Kent 1987).

The effects of wetland drainage on local climate are not well understood. Although increased humidity in areas surrounding wetlands could have a significant effect on crop production (Andres et al. 1984), strong evidence of such an effect is lacking. Wetlands in Alberta may not have a significant effect on precipitation since most of the moisture in the air over the province originates in the Pacific Ocean. The amount of moisture added to the atmosphere by evaporation of surface water would be minimal compared to the amounts in the Pacific air mass.

2.3.7 Wildlife and Fisheries Habitat Value

Wetlands, wetland margins and associated upland areas provide important habitat for a large variety of plant and animal species. In Alberta, roughly 45 species of waterfowl, 81 species of other birds and at least 30 mammals such as beaver, mink, muskrat, moose and deer, use wetlands or wetland margins for all or part of their life cycles. Pike use emergent aquatic and wetland areas for spawning. Wetlands may help maintain the quality of water in adjacent lakes and streams that support fish populations. Many of the animals that depend on wetlands are important for hunting, fishing, trapping and non-consumptive uses.

The value of wetlands as waterfowl habitat has attracted a great deal of attention. The threat to waterfowl from the loss of slough/marsh habitat is a major wetland management concern (Environment Canada 1986). The relationship between wetlands and waterfowl is important because wetland habitat is critical for waterfowl production and migratory bird hunting represents the most significant measurable economic return from wetlands. In 1981, $231 million was spent on waterfowl hunting in Canada (Filion et al 1983). In comparison, the overall cost of waterfowl in Canada was estimated to be $24.9 million (Filion and Parker 1984). Jacquemot et al (1986) estimated the total net economic value of hunting waterfowl in Alberta to be $14.9 million in 1981. In 1987, $194 million was spent on hunting waterfowl in Canada (Filion et al 1989). The same authors also estimate that a total of $2.7 billion was spent on non-consumptive use of wildlife in Canada in 1987. The economic value of non-consumptive use of wetland-related wildlife in Alberta is significant.

3.0 WETLAND MANAGEMENT OBJECTIVES, CONCERNS AND PRINCIPLES

3.1 Objectives

A wetlands management policy for the settled area of Alberta must recognize existing provincial government management objectives for wetland resources. The following objectives for wetland resources have been stated or implied in government policies. The objectives may conflict in some situations and it may not be possible to meet all objectives for every wetland. The objectives must be reconciled under the balanced approach required to manage wetlands. Drainage may be in the best interests of Albertans in some situations and should not be excluded as a management tool. The objectives are equally important and should be considered when wetland management decisions are being made:

a) maintenance of long-term agricultural productivity including conservation of soil resources.

b) maintenance of ecological values.

c) maintenance of heritage values.

d) maintenance of peat resource values.

e) protection of private and public property and public safety.

f) maintenance of recreational and tourism opportunities.

g) maintenance of a sustainable supply of high quality groundwater.

h) protection and improvement of surface water quality.

i) retention of wildlife habitat and maintenance of wildlife populations.

3.2 Concerns

The following concerns were considered during development of the draft wetlands management policy for the settled area of Alberta:

a) There has been a significant loss of wetlands in the settled area of Alberta. This is particularly true for slough/marsh wetlands in the central and southern regions of the province.

b) Different types of wetlands with different values are found on private and public land throughout the settled area of the province. The distribution, permanency and importance of wetlands vary throughout the settled area. Different wetlands have different biological, physical and chemical characteristics.

c) The costs and benefits of wetland drainage and retention are distributed unevenly among landowners and society as a whole. Many of the benefits of wetland drainage and the costs of wetland retention can be assigned to the landowner, while many of the costs of wetland

drainage and the benefits of wetland retention are societal in nature. Landowners do receive benefits of wetland retention as members of society and may receive on-farm wetland benefits as well. Few methods exist to transfer the value of societal benefits derived from wetlands on private land to the landowner.

d) Albertans are generally unaware of the many benefits of wetlands and are often unaware or indifferent to the loss and degradation of wetlands that result from human activities.

e) Drainage is attractive to many agricultural producers. Drainage increases operating efficiency and is financially feasible in many situations if agricultural producers are not made liable for off-farm and mitigation costs. In addition, subsidies and incentives for drainage have been available and there has been social pressure to drain wetlands.

f) Programs offered by government departments and non-government organizations often appear to conflict in purpose with respect to wetlands. Among the numerous government programs that affect wetlands, some have had the effect of promoting drainage while others serve to preserve wetlands.

3.3 Principles

The following principles guided the development of the draft wetlands management policy for the settled area of Alberta:

a) Wetlands provide numerous resource values that are directly and indirectly linked. Integrated management of wetland resources is desirable. Where appropriate, wetlands should be managed to produce multiple benefits.

b) The interests of individual landowners and Alberta society as a whole must be considered. Solutions should be sought that benefit both groups.

c) Existing legislation, policies and programs of the various government departments must be considered. Changes to legislation, policies and programs may be necessary.

d) Society has some responsibility to assist in the protection of wetlands on private land. Some of the disadvantages of maintaining wetlands are borne by the landowner while many of the benefits go to society.

e) Wetland management and conservation require the cooperation and support of federal, provincial and municipal governments and private individuals and organizations.

4.0 REVIEW OF EXISTING LEGISLATION, POLICIES AND PROGRAMS

Wetlands in the settled area of Alberta are under the control of individuals, private organizations and governments. Approximately 73 percent of the settled area is private land, 23 percent is public land under provincial government control and the remaining 4 percent is land under the control of the federal government, Metis settlements and Indian reserves. Decisions respecting wetlands are made by a variety of private individuals and organizations and federal, provincial and municipal governments.

This section of the report highlights the current government legislation, policies and programs could affect wetlands. Some of these are ineffective in controlling the rate of wetland loss or are seen as promoting wetland loss. Many contain provisions that could be applied to the management of wetlands given a strong wetlands management policy for the settled area of Alberta.

4.1 Legislation and Policies

4.1.1 Summary of Provincial Legislation and Policies with Potential Impacts on Wetlands

Although there are no acts that deal specifically with wetland management, many pieces of legislation affect wetlands indirectly. The following is a list of provincial legislation and associated policies that might affect wetlands. The department responsible for administration of each act is indicated in parentheses.

4.1.1.1 Water Resources Act (Alberta Environment)

The Water Resources Act provides for licensing of all diversion and use of water. The act states that "No person shall divert or use any water except under the authority of this Act, the regulations or a licence, interim licence or permit issued under this Act (S.5(1)(a))." A licence may be issued ". . . to divert water, otherwise than by impoundment or storage, for the purpose of water management, flood control, drainage, erosion control or channel re-alignment or for any like purpose (S.11(1)(d))". All drainage requires a licence under the Water Resources Act. The Water Resources Act is very complex and will be examined in an upcoming review of all legislation under Alberta Environment's mandate.

A licence may also be obtained "to use water in its natural state for the purpose of conservation, recreation, or the propagation of fish or wildlife or for any like purpose" (S.11(1)(c)). The Wagner Natural Area is the only situation in Alberta where a natural state licence has been issued for wetland protection. The effectiveness of natural state licenses for specific purposes, such as habitat maintenance, may be limited by the location of the licensed area within a basin. Maintaining an area in the lower part of a basin in a natural state may require excessive restrictions on upstream activities.

Section 5 of the act provides for enforcement of licensing requirements and has been used successfully in instances where wetlands have been drained illegally. Section 6 allows the Minister to remove or render ineffective any works constructed without a permit, and to dam or otherwise fill in any illegal excavation, ditch or canal. The cost of these activities by the Minister is borne by the person responsible for the illegal works. Enforcement is generally carried out in response to

complaints from downstream users or other affected parties. In spite of enforcement efforts, unlicensed "midnight" drainage continues to occur.

The act also provides for construction of works and undertakings, including drainage projects, by the Minister, alone or jointly with local authorities. This provides a mechanism whereby public funds may be used for any water management purpose, as has been the case with the Alberta Water Management and Erosion Control program (discussed later in this chapter). Section 64 of the act provides a "notwithstanding" provision by which the Minister may approve drainage projects without formal licensing.

4.1.1.2 The Department of the Environment Act (Alberta Environment)

This act contains provisions for establishment of "water conservation areas" and "restricted development areas" for the purpose of "preventing the deterioration of the quality of the environment of the area by reason of the development or use of land in the area incompatible with the preservation of that environment" (S.16(1)(d)). Development can be restricted or prohibited and the Minister of the Environment may purchase or expropriate any estate or interest in land in these areas. Current policy is to purchase only those lands required for transportation and utility corridors.

Restricted Development Areas (RDAs) have been used primarily in and around major urban centres. Although no Water Conservation Areas (WCAs) have been established, they have the same function as RDAs and differ in name only. This portion of the act seems to be well suited for wetland preservation. Regulations are currently written for individual RDA's. However, it would be possible to write a common regulation that would apply to several designated areas such as wetlands. This portion of the act is arguably the most powerful tool for land use control currently available, as it supersedes all other provincial legislation. The legislation has survived several court challenges.

4.1.1.3 Drainage Districts Act (Alberta Environment)

This act provides for the creation of a drainage district and gives administrative responsibility to a drainage district board of trustees. This board undertakes construction, operation and maintenance of drainage works in the district. Drainage districts are formed through submission of a petition signed by the registered owners of at least 75 percent of the proposed district land area. If this petition is accepted, a vote is taken on the formation of the district and the election of trustees. A two-thirds majority is required for formation of the district.

There are currently nine drainage districts, covering approximately 175 000 acres (71 000 hectares). All are located in central Alberta. The last drainage district was formed in 1956. The high costs of operation, maintenance and administration for a district and the availability of cost sharing programs under the administration of local authorities (e.g. the Alberta Water Management and Erosion Control Program) has removed much of the incentive to form new drainage districts.

The establishment of a drainage district would certainly encourage drainage and hence accelerate wetland loss. Although drainage may be appropriate in some situations, the level of drainage activity that would be required to warrant the effort and expense of forming a drainage district would more than likely conflict with the habitat retention and soil moisture conservation objectives listed in Section 3.1. A great deal of land must be drained to recover the costs of establishment and operation of the district. Finally, a drainage board of trustees has no mandate for multi-purpose water use.

4.1.1.4 Irrigation Act (Alberta Agriculture)

This act provides for the creation of irrigation districts and their governing boards, which regulate drainage relating directly to the irrigation system. Other drainage activities are subject to licensing under the Water Resources Act.

The Irrigation Act currently limits the ability of individual districts to enter into any projects involving multiple use of water. This has constrained the ability of the Fish and Wildlife Division to enter into habitat agreements with irrigation districts. A district may provide water for other purposes, providing the other purposes are licensed under the Water Resources Act.

4.1.1.5 Public Lands Act (Forestry, Lands and Wildlife)

Section 3 of the Public Lands Act provides for provincial government ownership of the bed and shore of all "permanent and naturally occurring" bodies of water. It is notable that the beds and shores of most major waterbodies are public land even without this provision, since they were excepted from the grant and subsequent titles. Section 3, therefore, applies to those beds and shores contained within lands that have been granted without mention of a waterbody.

The bank is the limit between the publicly owned bed and shore and adjacent upland. Definitions of the bank and the bed and shore have been derived from the common law and are contained under Section 17(2)(3) of the Surveys Act:

> "2) When surveying a natural boundary that is a body of water, the surveyor shall determine the position of the line where the bed and shore of the body of water cease and the line shall be referred to as the bank of the body of water.
>
> 3) For the purpose of this section, the bed and shore of a body of water shall be the land covered so long by water as to wrest it from vegetation or as to mark a distinct character on the vegetation where it extends into the water or on the soil itself."

A surveyor is responsible for determining the location of the bank in the field and depicting it on a plan of survey. This does not preclude staff or others dealing with waterbodies from knowing what a natural boundary is and the laws relating to waterbodies. Like any other owner, the provincial government has the right to question the surveyor's opinion as to the location of these boundaries. In the event of disputes, the final arbiter is a judge of the court.

Other sections of the Public Lands Act that could have an impact on wetlands are the following:

> Section 10 - allows departmental personnel to reserve and protect public land from uses or developments that are harmful. This includes reserving and protecting large acreages of public wetlands such as organic areas, streams, lakes and marshes.
>
> Section 51(d,e) - outlines prohibitions to any act or disturbance that may injuriously affect watershed capacity or result in injury to bed and shore of river, stream, watercourse, lake or other body of water.

Section 34(2) - outlines the authority to direct that a disposition may be made subject to a reservation or exception as prescribed by the Minister. This allows certain management objectives to be added to a contract for use of public land, such as restricted development or buffer zones.

4.1.1.6 Wilderness Areas, Ecological Reserves and Natural Areas Act (Recreation and Parks, Forestry, Lands and Wildlife)

This act provides the authority to set aside public lands for "ecological purposes" including scientific study, preservation of a natural ecosystem, protection of endangered plant or animal species, study of ecosystem recovery or protection of unique or rare examples of natural biological or physical features. Such areas are designated as ecological reserves and are subject to a wide range of restrictions. Natural areas are less restrictive and are designated to "protect sensitive or scenic public land from disturbance, and ensure the availability of public land in the natural state for use by the public for recreation, education or any other purpose."

The impact of this legislation is restricted to the individual areas under protection. The Wagner, Beaverhill Lake and Outpost Wetlands natural areas are examples of where this designation has been used specifically to preserve wetland ecosystems. Natural area or ecological reserve designation may also indirectly result in wetland preservation, as is the case in the Wainwright Dunes Ecological Reserve, which encompasses prairie potholes.

Most natural areas and ecological areas are small and the impact of this legislation on provincial wetlands may be minimal. This act would obviously be ineffective in protecting wetlands scattered widely across private land. Natural areas and ecological reserves are important, nonetheless, for their educational, scientific, recreational and non-economic value.

4.1.1.7 The Wildlife Act (Forestry, Lands and Wildlife)

This act explicitly prohibits the sale of access to any land for hunting (S.49 (1-3)). One of the economic benefits associated with habitat retention is increased hunter activity and the Alberta Cattle Commission (1988) has pointed out that Section 49 provides a disincentive to maintaining wildlife habitat. Maintenance of wildlife habitat involves costs to the landowner including forgone agricultural benefits, direct costs of protecting and developing habitat, damage caused by wildlife, damage caused by irresponsible hunters and the costs of administering access to and use of the wildlife resource.

While the repeal of Section 49 of the Wildlife Act would allow the establishment of a market for hunting access, several related issues would remain unresolved. Wildlife are migratory and habitat retained with the expectation of gaining profits from hunting may produce wildlife that is harvested elsewhere. No financial benefits would be gained by the person providing the habitat. In addition, the values of wildlife which are unrelated to hunting would still not be addressed. Paid access to private land would be unattractive in areas with an abundance of public land. A study in southwestern Manitoba found that 75 percent of landowners surveyed were strongly opposed to paid hunting for reasons that included the inconvenience of monitoring hunters, the difficulty of policing such a system and the feeling that wildlife was a public resource for which hunters should not have to pay (Morgan 1985).

Few would argue that the present situation is unfair to the landowner in at least one respect. In most other situations, people responsible for access management are paid for their efforts.

However, Section 49 expressly forbids payment of landowners for the task of managing access to their land for hunting. Although there are arguments on both sides concerning paid hunting, there should be little disagreement on the need to examine the access issue.

The Wildlife Act also gives the Department of Forestry, Lands and Wildlife the authority to establish wildlife and game bird sanctuaries, wherein no hunting or trapping is allowed without specific approval. There are currently six of these sanctuaries designated in the settled area of Alberta.

4.1.1.8 The Planning Act (Municipal Affairs)

Section 98 of this act allows a subdivision-approving authority to require the owner of a proposed subdivision to provide part of the parcel of land as an "environmental reserve" if it consists of "a swamp, gully, ravine, coulee or natural drainage course". Environmental reserves are not used generally for wetland protection or management by municipalities except in the case of shoreline protection in areas of cottage development. Even if environmental reserves were more widely used, enforcement mechanisms inadequate to ensure the reserve would not be encroached upon.

In a strict technical interpretation of the act, drainage or other alteration of a wetland could constitute development and would require a development permit from the municipality. Municipal land use bylaws, if any, would apply. A municipality could pass a bylaw restricting drainage if it decided that development of wetlands should be curbed. An attempt by the town of Sylvan Lake to use land use bylaws in this manner was abandoned as it was felt the bylaws would not withstand a court challenge.

The purpose of the Planning Act is to "Maintain and improve the quality of the physical environment ... without infringing on the rights of individuals except to the extent that is necessary for the greater public interest." The effect on individual landowners of widespread application of this act to restrict wetland drainage would be significant.

4.1.1.9 The Municipal Taxation Act (Municipal Affairs)

Municipal taxes are often cited as an incentive for wetland drainage. Since wetlands are not explicitly delineated on tax assessment notices, some landowners may think wetlands on their land are taxed at the same rate as productive farmland and may feel compelled to get as much production out of them as possible. This interpretation is based on the questionable assumption that the landowner has no knowledge of the actual assessment of his or her land. A study in Saskatchewan found that when landowners were asked what they felt would be a fair tax rate on wildlife habitat, most chose a rate higher than they were actually paying (Melinchuck and MacKay 1986). A Manitoba study found that 80 percent of landowners surveyed indicated that a breakdown of their tax assessment by area would be a "positive step" toward preserving habitat. A similar situation probably exists in Alberta.

Clarification of the assessment process could reduce the confusion over the role of taxation in land use decisions. Close examination of the assessment procedure shows that municipal taxation may be a disincentive for drainage. Under the assessment, each acre is evaluated on the basis of its productive capacity for agriculture. Wetland areas are generally taxed at a very low rate such as 25 cents/acre (10 cents/hectare), if at all. If a landowner drains a wetland, the assessment on that area will rise to reflect the increased productivity. Tax savings generated by the wetland, such as reduced taxes for the inconvenience of farming around a slough, will be lost. Assessments occur every eight

years and unless an assessor is informed about a change in land status, a change in tax level might not take effect for several years.

Section 25(1)(c) of the Municipal Taxation Act exempts all land occupied by Ducks Unlimited (Canada) by lease or licence from assessment.

4.1.1.10 Soil Conservation Act (Alberta Agriculture)

The new Soil Conservation Act replaced an existing act of the same name, in July, 1988. The new act differs from the old act in many ways, the most notable being stiffer maximum fines for violations (i.e. raised from $200 to $5000) and the more detailed explanation of the appeal procedure.

The intent of the Soil Conservation Act is to provide a framework for encouraging sound soil conservation practices, to preserve Alberta's land base and to ensure that the agricultural sector can sustain its current level of activity. The act makes the landowner responsible for soil conservation and empowers a municipality to intervene if there is a conservation problem. Fines may be imposed if a problem persists. The Soil Conservation Act allows municipalities to pass bylaws concerning conservation measures such as topsoil removal or stubble burning.

The act is significant in two ways. Firstly, it places the onus of proper soil conservation squarely on the landholder. "The landholder shall prevent soil loss or degradation from taking place...." This is a clarification of the responsibility of a landholder. The landholder may "own, occupy or control" the land but he or she has responsibilities regarding the condition of the land. Ownership does not mean the right to degrade. Secondly, although the act has the power to enforce these conditions, charges and fines are the last resort. The emphasis is on correcting the problem rather than punishing the offender.

4.1.1.11 Department of Agriculture Act (Alberta Agriculture)

This act gives the Minister of Agriculture responsibility for the part of the government administration relating to agriculture. It provides the Minister with the authority to make loan guarantees to landowners for clearing, breaking, sloping, levelling, preparing, improving or developing land for any agricultural purpose. Although not mentioned specifically, drainage could easily fall under "improving" or "developing."

4.1.1.12 Agricultural Service Board Act (Alberta Agriculture)

Section 2 of this Act directs Agricultural Service Boards (ASBs) to "advise on the organizing of soil and water conservation programs" and "promote and develop policy" and assigns the duty of soil conservation officer to the agricultural fieldman of a municipality. The local ASB may recommend to the municipality that land be subject to supervision, rehabilitation or reclamation if, among other things, they find that water erosion has impoverished the land or the productivity of the land has been or may be seriously affected by any other cause.

4.1.1.13 Special Areas Act (Municipal Affairs)

The Special Areas cover approximately 5 million acres (2 million hectares) along the eastern edge of Alberta. Staff of the Department of Municipal Affairs and locally elected officials are represented on the board which administers the Special Areas. Section 7 of the Special Areas Act

authorizes the Minister to "order and require any owner or occupant of the land to adopt any methods of farming or grazing, or farming and grazing, that he considers necessary to prevent soil drifting, water erosion" and "promote measures for the development and conservation of any and all available natural resources." This act could be used to protect wetlands within the Special Areas. There are numerous Duck Unlimited projects in the Special Areas.

4.1.1.14 Provincial Parks Act (Recreation and Parks)

The Provincial Parks Act allows the Minister to designate provincial parks "for the conservation and management of flora and fauna" and "for the preservation of specified areas and objects therein that are of geological, cultural, ecological or other scientific interest." This act could be used to protect unique or representative wetlands within provincial parks and recreation areas.

4.1.1.15 Forests Act (Forestry, Lands and Wildlife)

This act allows the Minister to make regulations regarding the management and use of forested public land. Maintenance or removal of upstream forest cover on public land may affect wetlands.

4.1.2 Summary of Federal Legislation and Policies With Potential Impacts on Wetlands

The first two acts in this section deal with federal government responsibilities toward wildlife. The remainder are acts that directly or indirectly affect wetlands.

4.1.2.1 Migratory Birds Convention Act (Environment Canada)

This act ratified the International Convention for the Protection of Migratory Birds of 1916, an agreement between Mexico, the United States and Canada to ensure the protection of migratory birds. There is also a section (S.6(a)) which states "no person shall disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird." This section is not widely used.

4.1.2.2 Canada Wildlife Act (Environment Canada)

This act empowers the federal Minister of the Environment to co-ordinate joint federal - provincial programs and to acquire, in the name of the Crown, lands for research, conservation and interpretation in respect of migratory birds or other wildlife.

Section 2(2) of the act is significant in that it makes "all provisions of this Act respecting wildlife extend to wildlife habitat," recognizing the important connection between habitat availability and wildlife populations.

4.1.2.3 Department of Agriculture Act (Agriculture Canada)

The primary objective of this act is the enhancement of the Canadian agricultural industry. The subsidies, grants, tax incentives, extension programs and research activities supported by the act are generally geared toward agricultural intensification and therefore could have an impact on wetlands.

4.1.2.4 Prairie Farm Rehabilitation Act (Agriculture Canada)

This act was originally proclaimed in the 1930s to address soil degradation problems caused by drought. The body which administers this act, the Prairie Farm Rehabilitation Administration (PFRA) is active in land use management and water development on farms in Manitoba, Saskatchewan and Alberta.

4.1.2.5 Canadian Wheat Board Act (Canadian Wheat Board)

The Canadian Wheat Board (CWB) was created to market Canadian grain for interprovincial and export trade (Rakowski and Jurick 1986). The CWB sets grain delivery quotas that are currently based on total seeded and summer fallow acreage. This basis for quota determination has been criticized for encouraging cultivation of marginal land and hence promoting habitat destruction.

A review of the delivery quota system was initiated in 1987. At the time of this writing, the CWB is considering a change from the acreage-based delivery quota system to volume based delivery contracts. This type of system would remove the present incentive to break marginal land and limit forage land.

4.1.2.6 Income Tax Act (Revenue Canada)

Under this act farmers receive federal income tax deductions for costs incurred in land clearing, levelling and drainage. A double monetary incentive for drainage may be available if a farmer borrows money for drainage at subsidized rates (e.g., under the Farm Credit Act) and then recovers the costs through tax deductions (Rakowski and Jurick 1986).

4.1.2.7 Canada Water Act (Environment Canada)

Section 5(e) of this act empowers the federal government to enter into agreement with provincial governments for the "efficient conservation, development and utilization" of any waters where there is a significant national interest. This act does not appear to have been used in a wetland context although it gives authority for joint projects like the North American Waterfowl Management Plan. The Ottawa Field Naturalists suggested this act as a means to protect wetlands (Government of Canada 1985). No indication was given as to how the act might be applied for this purpose. The hearings for the Inquiry into Federal Water Policy (Government of Canada 1985) concluded that although the Canada Water Act provides a framework for cooperative and coordinated approaches to water problems, there seems to be little will to use the act for this purpose.

4.1.2.8 Other Federal Acts

Various other pieces of legislation indirectly affect wetlands in as much as they provide means, through low cost loans or tax credits, for farmers to expand and improve their productive land base often at the expense of a wetland. These acts include the Farm Credit Act, the Agricultural and Rural Development Act, the Agricultural Stabilization Act, the Farm Improvement Loans Act and the Excise Tax Act. Other federal legislation that may have application to wetland protection include the National Parks Act and the Federal Fisheries Act.

4.1.2.9 Federal Policies

In 1981, the federal government signed the Convention on Wetlands of International Importance in Ramsar, Iran (Adams 1988). The Ramsar convention was sponsored by the International Union for the Conservation of Nature. Canada agreed to promote conservation of critically important wetlands. Beaverhill Lake, east of Edmonton, is one of five Ramsar sites in the Continental Prairie Wetland Region.

The Federal Water Policy (Environment Canada 1985) contains the following statement on wetlands preservation "... to conserve and enhance Canada's wetlands through short- and long-term actions co-ordinated with other governments, private organizations, landowners and the public." The actions to be taken by the federal government with respect to this policy include the following:

- reviewing and minimizing negative impact of other federal policies and programs;
- conserving wetlands on federal lands;
- cooperating with other governments in wetland conservation;
- encouraging appropriate land use practices;
- conducting research;
- pursuing cooperative international and federal-provincial habitat protection, research and management programs for fish and waterfowl; and
- promoting public awareness of wetland values and public participation in wetland conservation.

The federal government initiated development of a policy statement on wetland conservation in 1987. The policy is being developed under the authority of the Interdepartmental Committee on Land while the Federal/Provincial Committee On Land Use (FPCLU), formerly the Canada Committee on Land Use (CCLU), provides provincial/territorial liaison.

A subcommittee of the FPCLU produced a "A Framework for Wetlands Policy in Canada" that was endorsed by the full FPCLU in September 1987. This document addresses the concern that wetland loss has reached critical levels in some areas and sets forth the following principles:

- wetlands are essential natural resources.
- wetlands have both economic and social values.
- a scientific understanding is essential to the wise use and management of wetlands.
- wetlands are an integral part of the ecological system.
- wetlands and wetland systems contribute to the preservation of genetic diversity.
- it is possible to use wetlands for more than one purpose while at the same time maintaining the integrity of the wetland.
- measures to secure and manage wetlands should recognize existing land use practices.
- Canada has international wetlands conservation responsibilities and obligations.

The document subsequently discusses policy strategies such as inclusion of wetlands in land use management decisions, securing wetlands and developing education programs. It is interesting to note that the FPCLU policy talks about "wise use" of wetlands and contains a statement on multiple use while the Federal Water Policy seems to strictly address wetland preservation.

The focus of the March 1989 draft of the Federal Policy on Wetland Conservation (Environment Canada 1989) is on "integrating concerns for wetland conservation into the daily

decisions of the federal government in all relevant policy and program areas." The overall federal objective is to promote conservation of Canada's wetlands to sustain the ecological and socio-economic functions of wetlands, now and in the future." The federal government will strive to achieve the following four goals:

- maintenance of wetlands throughout Canada and the enhancement of wetlands in areas where the continuing loss or degradation of wetlands has reached critical levels;
- recognition of the wetland functions in resource planning and management, and in the economic decision-making process;
- protection of wetlands of national significance; and
- utilization of wetlands in a manner that enhances prospects of their sustained and productive use by future generations.

The draft policy provides nine principles to guide federal activities:

- wetlands contribute to the health and well-being of Canadians and are a priority for environmental conservation and sustainable development;
- wetland conservation depends on incorporating environmental objectives into economic decision making;
- wetland conservation must occur within the context of an integrated systems approach to environmental conservation and sustainable development;
- development of scientific knowledge and expertise on wetlands is required;
- a coordinated, cooperative approach to wetland conservation involving all levels of government and the public is required;
- the federal government has a legitimate role in wetlands conservation and must respect the jurisdictions of the provinces and territories and the rights of individual landowners;
- aboriginal peoples have a special interest in wetlands;
- a change in the attitude and perceptions of Canadians toward wetlands is required; and
- Canada has an international responsibility regarding wetland conservation.

The draft federal policy on wetland conservation continues with seven management strategies to provide for the wise use and management of wetlands and concludes with a detailed, five-year implementation plan to put the policy into effect.

In 1986, the Conference of First Ministers Responsible for Agriculture released "A National Agricultural Strategy." This document stressed the need for the conservation and development of soil and water resources to ensure continuing agricultural productivity. It called for a coordinated soil and water conservation program and noted that federal and provincial programs will need to be "reoriented" to adapt them to changing conservation needs. The significance of this document is the recognition of the importance of water conservation to agriculture and the intent to negotiate federal-provincial agreements to finance and coordinate agricultural soil and water conservation programs.

Another policy statement of interest is the Federal Policy on Land Use (Government of Canada 1984). Although this policy applies only to land under federal control, the guiding principles are of interest. One principle states:

> "The free exercise of a) private rights and obligations associated with land ownership; and b) the operation of the market as the prime allocator of privately owned land must be preserved unless clearly demonstrated to be contrary to the public interest."

A possible interpretation of this statement is that habitat preservation efforts should be concentrated on public lands and that there would have to be a clearly demonstrated reason before legislation which limits the options of landowners would be passed.

4.2 Programs and Agency Activities

4.2.1 Alberta Environment

4.2.1.1 Alberta Water Management and Erosion Control Program

The objective of the Alberta Water Management and Erosion Control Program (AWMECP) is to provide assistance to local authorities for the enhancement of water resources and to provide corrective measures where water, in its natural state, creates conditions adverse to the public interest. The program provides grants on a 75:25 percent cost sharing basis for water management projects and grants on an 86:14 percent basis for flood control, drainage and erosion control projects on agricultural lands. For projects in the Northern Alberta Erosion Control Area, 100 percent of engineering costs are covered by the program and maintenance costs may be partially covered.

Any local authority with a water problem may approach the Department of Environment for assistance. The department then does an inspection to determine if the project is eligible. Projects for flood control, erosion control and drainage are eligible for consideration. The AWMECP brochure also specifically mentions "fish, waterfowl and wildlife enhancement" projects as being eligible for funding under the program. Projects are expected to be in the public interest, promote sound management and have a demonstrated need. In addition, projects must be technically, environmentally and economically feasible. Some drainage has occurred under AWMECP as part of agricultural water management projects. Alberta Environment has on occasion used the financial leverage of the program to ensure the preservation of wetlands, in spite of the desires of landowners and municipalities. A provincial wetlands policy would be useful in assessing AWMECP water management projects where conflicts arise over drainage.

4.2.1.2 Sub-Basin Water Management Planning Study in Northwestern Alberta

The Sub-Basin Water Management Planning Study (SWMP) was initiated in April 1985 in response to concerns about comprehensive water management planning in northwestern Alberta (Alberta Environment 1988). The study has addressed the need for water management planning, management of agricultural drainage, erosion control, on-farm water management and mitigation of wildlife habitat losses.

Based on completed work, the study has reached several conclusions regarding drainage of wetlands in northwestern Alberta. Among the most important are the following:

- The provision of a comprehensive drainage system (i.e., on-farm drainage and erosion control, off-farm drainage and erosion control, and mitigation of lost wildlife habitat) is extremely expensive within most drainage basins in northwestern Alberta, given current technology and land prices.

- Erosion protection for valley wall coulees and similar drainage outlets is extremely expensive. Upwards of two-thirds of the total cost of a drainage system can be attributed to valley wall coulee erosion control.

- The retention of wetlands on private lands is essential for cost-effective water management in many Water Management Units. However, there are currently no policies in place to ensure the retention of wetlands on private lands. This conclusion points directly to the need for the policy direction that is recommended in this report.

Probably the most significant finding of the study is the very high cost of comprehensive drainage systems when all costs (i.e. off-farm, on-farm and wildlife mitigation) are considered.

4.2.1.3 River Basin Planning Program

The Athabasca and North Saskatchewan river basin plans include drainage and wetland components. River basin planning allows for addressing of wetland- and drainage-related concerns in the context of the basin as a whole.

4.2.1.4 Water Management Principles for Alberta

Although the Water Management Principles (Alberta Environment 1983) do not address wetlands specifically, certain general principles, that may be applied to wetlands management, are outlined. These include the following:

- Water conservation
- The principle of multi-purpose use
- Water pollution protection
- Cost sharing with local authorities
- Intergovernmental cooperation

4.2.2 Alberta Agriculture

4.2.2.1 Soil Conservation Area Program

In 1972, the Soil Conservation Area Program (SCAP) was established by Alberta Agriculture. This program provides cost-sharing grants of up to 60 percent to Agricultural Service Boards undertaking programs related to soil erosion and salinity. Although this program was not intended to do so, some funding of drainage occurred. To correct this situation, the SCAP guidelines were changed in the early 1980s to specifically state that SCAP funding was for reclamation of water-caused erosion and not for drainage. This created a gap in funding. Large water management projects were eligible for AWMECP cost sharing, but smaller on-farm water management projects had no similar program.

4.2.2.2 Farm Development and Reclamation Program

In recognition of the need for a program other than SCAP to deal with on-farm water issues, the Farm Development and Reclamation Program (FDRP) was created in 1985. This program provides grants similar to those under SCAP for slough consolidation and on-farm drainage and channel improvements. Grant allocations under FDRP total approximately $100 000/year.

The FDRP program was designed to help landowners alleviate problems created by insufficient or excess on-farm water. The majority of the work since the inception of the FDRP program has been straight-forward drainage. This has occurred in spite of efforts to promote greater end use of the on-farm water through the use of educational techniques such as brochures, posters and film presentations.

If the FDRP were solely a funding source for drainage, the potential for conflict with the objectives in Section 3.1 would be great. The FDRP program could potentially fit very well with the objectives, particularly with the promotion of on-farm water management. The FDRP guidelines were changed on April 1, 1989 to eliminate funding of uncontrolled drainage projects under the program. The new guidelines stress that FDRP projects should demonstrate the proper use of limited water supplies for domestic, livestock and crop production purposes.

Drainage projects that encompass an area larger than a single land parcel require licensing by Alberta Environment, while projects confined to a single quarter-section do not. Alberta Environment handles all off-farm water management and overall basin planning, while Alberta Agriculture provides services and programs for on-farm water management.

4.2.2.3 Irrigation Rehabilitation and Expansion

In the irrigated areas of the province, wetland habitat was often created unintentionally by leakage from many of the older canals. These wetlands provided highly productive habitat, particularly for game birds such as the pheasant. In 1969, a long-term program of canal rehabilitation was begun in part to fix the old, leaky canals and provide more efficient water delivery. This often had the effect of eliminating wetlands by cutting off the water supply. In some areas, particularly the Eastern Irrigation District, wildlife habitat has been incorporated into the rehabilitated works.

4.2.3 Fish and Wildlife Division, Alberta Forestry Lands and Wildlife

4.2.3.1 Buck for Wildlife

The Buck for Wildlife (BFW) program was established in 1973 to help retain, improve and develop fish and wildlife habitat throughout the province. BFW funds are derived almost exclusively from levies on hunting and fishing licenses. Many projects are funded jointly with other organizations. In 1986 the $2.3 million spent by BFW was matched by over $4 million from Alberta Environment, Ducks Unlimited Canada and a range of private and corporate sponsors. Although the BFW program funds a wide variety of habitat enhancement projects, a significant portion of the BFW budget goes to development and protection of wetlands. The Alberta contribution to the First Step - Buffalo Lake Moraine project under the North American Waterfowl Management Plan comes entirely from BFW funds. In 1988, over $900 000 was used to improve 11 400 acres (4600 hectares) of habitat for waterfowl and upland birds.

4.2.3.2 Landowner Habitat Program

The Landowner Habitat Program (LHP), was initiated in 1978 as a pilot program in the county of Red Deer, and has since been expanded to the county of Minburn and the Bow River and Eastern Irrigation Districts. The LHP offers financial and other incentives to landowners for habitat preservation and enhancement. The program is not a subsidy, rather it is an arrangement between the landowner and the Fish and Wildlife Division. Options under the LHP include setting aside marginal

agricultural lands for habitat as well as use of management practices such as rotational and deferred grazing, limited tilling, fencing and delayed haying. The LHP has been very popular with landowners. As of December 31, 1989, 220 agreements had been signed and 31 150 acres (12 600 hectares) of wildlife habitat had been retained.

The Minister of Forestry, Lands and Wildlife recently announced the intention to expand the LHP into a major provincial program dedicated to the retention of essential habitat on private lands (Government of Alberta 1989).

4.2.3.3 Cooperative Ventures Agreement with the Eastern Irrigation District

This is a joint venture involving Fish and Wildlife, Ducks Unlimited and the Eastern Irrigation District (EID) to develop wildlife habitat and agriculture in the EID. Three million dollars will be spent over three years on habitat development.

4.2.3.4 Wetlands for Tomorrow

The cost of this program was shared between Alberta Fish and Wildlife and Ducks Unlimited Canada. Twenty key wetlands in Alberta (i.e., predominantly large staging areas) were targeted for preservation and enhancement from 1982 to 1987. A renewal agreement for an additional five-year period is being developed.

4.2.4 Public Lands Division, Alberta Forestry Lands and Wildlife

4.2.4.1 Integrated Resource Planning Program

Integrated resource planning (IRP) provides direction for the management and use of public lands and resources within planning areas throughout Alberta. Plans are prepared under a philosophy of integrated resource management that recognizes the effect management of one resource or use has on the management of other resources or uses. Public involvement is an integral part of the program. Many integrated resource plans contain management objectives and guidelines for protection of wetland resources. All integrated resource plans are developed within the context of current government policy for the various resources under consideration. A wetlands policy would be useful to the IRP process.

4.2.4.2 Ecological Corridor Agreements

When public lands are scheduled for sale, buffer areas around waterbodies may be delineated with the width of the buffer determined by watercourse size, nature of the banks and ecological significance. A caveat may be registered against the title to protect the buffer area from development.

4.2.4.3 Reservations

Reservations identify and record public lands that are required for the protection, development or management of public resources. Applications for reservations are made by several agencies and departments within the provincial government. Final authority for placement of a reservation in the settled area of Alberta lies with Public Lands Division. The reservation review process considers the positions of and provides for consultation with other government departments that may have an interest in proposed land use activities for an area.

Typical reservations placed on wetlands are for adverse soil conditions (e.g. organic/poorly drained soils) as a limitation for agriculture or as a water resource management area to recognize the value of the wetland to local hydrology.

4.2.4.4 Land Exchange Program

Under the Land Exchange Program, deeded lands or public lands under lease may be exchanged for vacant public lands. Although exchanges usually are made to consolidate land ownership into compact farming units, exchanges for the purpose of wetland conservation are feasible under this program. The program has had the most impact in southern Alberta. Between 1983 and 1987, staff of the Public Lands Division negotiated exchanges of about 63 000 acres (25 500 hectares) of public lands for about 67 000 acres (27 100 hectares) of environmentally sensitive land in the M.D. of Cypress. Wildlife, recreational and environmental considerations have prompted an increase in land exchanges in recent years.

4.2.5 Joint Federal-Provincial Activities

4.2.5.1 The North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP), a strategy for conservation and management of waterfowl in North America, was signed by the Minister of Environment for Canada and the United States Secretary of the Interior in 1986. It is a multi-agency effort that in Alberta involves the provincial Fish and Wildlife Division, the Canadian Wildlife Service, Ducks Unlimited Canada, Wildlife Habitat Canada, Alberta Agriculture and others. The North American Wetlands Conservation Act (i.e. the Mitchell bill) was passed by the United States government on December 13, 1989 and authorizes the transfer of $26.5 to $48.8 million to Canada to implement provisions of the NAWMP. Alberta may receive as much as $16 million a year under this program.

Total expenditures of $1.5 billion are planned over 15 years. The NAWMP includes three ventures: the Arctic Goose and Black Duck plans, which do not concern Alberta, and the Prairie Habitat Joint Venture. The Prairie Habitat Joint Venture calls for the enhancement of 3.6 million acres (1.5 million hectares) of waterfowl habitat in the prairie provinces at a cost of $1 billion over 15 years. Of this, $360 million will be spent in Alberta enhancing 1.4 million acres (0.57 million hectares) of marginal agricultural land. Implementation of this program is expected to ensure that the annual contribution to the continental breeding population from the southern prairies will average 4.8 million mallards, 3.3 million pintails and a total of 17.3 million ducks.

The first project initiated under the Prairie Habitat Joint Venture in the province is the Alberta First Step Project - Buffalo Lake Moraine. Funding for the project has been provided as follows: $1.0 million from the U.S. government, $0.33 million from the Canadian Wildlife Service, $0.33 million from private organizations (i.e., Ducks Unlimited, Wildlife Habitat Canada) and $0.34 million from the Buck for Wildlife fund.

4.2.5.2 Canada/Alberta Waterfowl Crop Damage Compensation Program

This program is funded jointly by the governments of Canada and Alberta. The bulk of the Alberta contribution comes from a surcharge on all hunting licenses sold in the province. The compensation program is administered by the Alberta Hail and Crop Insurance Corporation. Compensation is either 75 percent of the commercial value of the crop or a maximum per acre level

established each year, whichever is less. Since the per acre payment is usually the lower value, actual compensation often amounts to much less than 75 percent of crop value. In recognition of this, both the federal and provincial governments have agreed in principle to abandon the per acre payment and boost compensation to 80 percent of commercial value. Discussions on formal acceptance and funding are continuing and implementation of this policy is anticipated in 1990.

An Alberta study (McConnell 1984) concluded that while present compensation programs play a limited role in the decision by landowners to retain waterfowl habitat on their land, compensation programs are important in reducing landowner opposition to habitat enhancement in other areas. The present level of compensation was found to be generally inadequate for this purpose, particularly where gross returns from crop production are high, such as irrigated areas.

Compensation in the 80 percent range would be a significant increase over the current situation but would still provide incentive for agricultural producers to protect crops from waterfowl depredation. Although crop depredation may be reduced substantially using simple and inexpensive protection methods such as scarecrows and noise deterrents, relatively few landowners take measures to protect their crops.

4.2.5.3 Canada/Alberta Waterfowl Crop Damage Prevention Program

This program is also funded jointly by the federal and provincial governments. Administration is by the Fish and Wildlife Division of Alberta Forestry, Lands and Wildlife. The aim of this program is to reduce crop depredation losses through provision of lure crops and feeding stations. Farmers are encouraged through this program to use devices such as scarecrows and propane cannons to prevent waterfowl crop damage.

4.2.5.4. Canada/Alberta Soil Conservation Initiative

In July 1989 the federal and Alberta governments signed the Canada/Alberta Soil Conservation Initiative (CASCI), a $34.8 million agreement aimed at fighting soil degradation in the province. The three-year agreement is being funded equally by both governments.

Included in this agreement is the Permanent Cover Program (PCP), which provides incentives to convert marginally productive and erosion susceptible cultivated lands to alternate uses. The PCP recognizes that there are costs involved in taking marginal land out of production, and provides assistance to cover both forgone net farm income and other costs in return for setting land aside for a specified period. The agreement also includes on-farm conservation demonstrations, funding for shelterbelt trees and a joint federal/provincial policy review aimed at identifying policies and programs that discourage farmers from adopting soil conservation practices.

In addition to CASCI, the Canada/Alberta Agreement on Soil, Water and Cropping Research and Technology Transfer (CARTT) will develop and transfer appropriate conservation tillage technology that will minimize soil degradation and sustain economic production. The aim of the program is the improvement of land management and the protection of natural resources. The program commits $4 million over a six-year period for applied and basic research, demonstration projects and research on conservation tillage.

4.2.6 Environment Council of Alberta

In 1981 the Government of Canada endorsed the World Conservation Strategy (WCS). One of the recommendations made at that time was that provinces develop conservation strategies in line with the WCS. In 1985, the Public Advisory Committee of the Environment Council of Alberta initiated the Alberta Conservation Strategy (ACS) project. Work is under way on a Wetlands Sector Report as part of this project. A first draft of this report was circulated publicly in May 1988, and the final version of the report is expected soon.

4.2.7 Local Authorities

Local authorities (i.e., counties, municipal districts and improvement districts) are often the first government agencies to become involved in drainage issues. As stated previously, the local authority must take the initiative to develop cost shared water management projects. Policies on drainage in the past have varied widely between municipalities. Some municipalities have been actively involved in water management and drainage projects while others are not involved in cost sharing agreements for water management. High initial costs and the burden of long term maintenance are the principal reasons for avoiding these programs.

Concern over environmental issues often appears initially at the local government level. Evidence of this could be seen at the conference on "Wetlands, Wildlife and Agriculture" held in Edmonton in April 1988. Representatives of the counties of Barrhead, St. Paul, Smoky Lake, Two Hills and Warner registered for the conference. The Barrhead Agricultural Service Board went so far as to request a meeting with the Wetlands Policy Steering Committee for the purpose of expressing their concerns about the extent of drainage and the conversion of marginal land in their area and expressed a desire to participate in policy development. Barrhead has since developed a plan of action that includes purchasing land to be set aside as environmental reserves and providing monetary incentives for shelterbelt planting, tree-cover retention and protection of wildlife habitat.

Local authorities provided part of the impetus for the Sub-Basin Water Management Planning Study and are fully involved. Several regional planning commissions are undertaking studies of environmentally significant areas. Concern for proper management of the environment is increasing in urban areas as well. The City of Calgary recently completed the "Southeast Wetlands Scoping Study" on multi-purpose stormwater management for a large area to be annexed by the city. Local governments will look to the provincial government for policy direction, program implementation and funding.

4.2.8 Federal Programs

4.2.8.1 Environment Canada

Environment Canada provides a secretariat for the Canada Committee on Ecological Land Classification (CCELC) (Ironside 1989). The National Wetlands Working Group of the CCELC has made significant contributions to wetlands conservation in Canada. The group has produced a national system for wetland classification and a reference book on the ecological characteristics of wetlands in Canada and has provided scientific advice during development of federal and provincial policies on wetland conservation.

The Canadian Wildlife Service (CWS) of Environment Canada is involved in many of the joint federal/provincial habitat projects mentioned in Section 4.2.5. The CWS is responsible for migratory waterfowl populations under the Migratory Birds Convention Act and works with the provinces on habitat requirements. As part of their migratory waterfowl mandate, the CWS has conducted extensive research on habitat loss, economic impacts of waterfowl hunting, waterfowl crop depredation and other topics directly or indirectly related to the management of wetlands. The CWS collects and analyzes information on waterfowl populations and harvests and maintains a dialogue with wildlife authorities in the U.S. The CWS provides the provinces with information to help them set seasons and bag limits that are consistent in a North American context.

The CWS is working with Wildlife Habitat Canada on the multi-year "Wetlands are Not Wastelands" project (Bardecki 1989). The objective of the project is to develop and evaluate procedures and methodologies that best demonstrate the values of wetland resources. To date the project has reviewed willingness to pay, opportunity cost and cumulative assessment approaches to the evaluation of wetland resources.

The CWS manages three bird sanctuaries and three national wildlife areas in the settled area of Alberta and enforces migratory bird regulations on federal lands.

4.2.8.2 Prairie Farm Rehabilitation Administration

A significant program of the Prairie Farm Rehabilitation Administration (PFRA) is the Rural Water Development Program. This program provides financial and technical assistance to individual farmers, groups of farmers and small rural agricultural communities. The most important activity of this program with respect to wetlands and on-farm water management is the dugout program. Dugouts can be an integral part of water management on farms and should be constructed in this context. PFRA dugouts are generally not designed to realize multiple benefits such as wildlife habitat.

4.2.8.3 Other Federal Programs and Activities

The impact of federal activities on Canadian land resources has been summarized in a report analyzing the relationships of various federal programs to the Federal Policy on Land Use (Bond et al. 1986). Some of the programs identified in that report are of interest with regard to wetland management in the settled area of Alberta because of that program's potential indirect effects on wetlands. A brief summary of selected programs follows.

Agricultural Research (Research Branch, Agriculture Canada). Research can play a substantial role in intensifying crop production and upgrading crop management. This could allow for the release of marginal farmland (e.g., wetlands) to competing uses without detracting from total agricultural productivity. However, productivity increases generally do not result in wetland retention and the opposite would be more likely. Research leading to larger field equipment has increased pressure to remove wetlands because they are difficult to manoeuvre around.

Farm Improvement Loans (Farm Income Service Branch, Agriculture Canada). Loans may be used to purchase land or equipment for conversion of marginal land.

Prairie Farm Rehabilitation Administration (PFRA) (Agriculture Canada). PFRA farm water supply projects (e.g., dugouts) could become an integral component of an on-farm water management program.

Tax Policy and Legislation (Finance). Tax policies, such as write-offs for capital drainage costs, have an impact on land use.

Western Diversification Initiative. The document A Framework for Diversification in Western Canada states:

> There is an increasing economic and environmental focus on Western Canada's wetlands and wildlife, especially waterfowl. Poor wetlands management not only endangers western wildlife but is having a negative impact on prairie agriculture by increasing soil erosion and soil and water degradation. Wildlife related activities now represent a significant economic sector which could be put at risk unless remedial action is taken.

The Western Diversification Fund has yet to be used for wetland-related projects.

Military Reserves (Defense). Canadian forces bases at Suffield and Wainwright include wetlands that may be affected by military activities.

5.0 ACTIVITIES OF NONGOVERNMENT ORGANIZATIONS

Many nongovernment organizations (NGOs) are either directly or indirectly involved in wetland management issues. The programs delivered by NGOs, either on their own or in concert with government organizations, can have a significant effect on wetlands. NGOs provide the opportunity for members of the public with similar interests to speak with a unified voice. This chapter will concentrate primarily on those NGOs that have initiated or participated in wetland-related programs or have voiced opinions on wetland-related issues.

5.1 Ducks Unlimited Canada

Ducks Unlimited Canada (DU) is a private, non-profit conservation corporation that has been active in Alberta since 1938. It is a major developer of waterfowl habitat. At the end of 1989 there were over 2000 DU project agreements in place in Alberta, covering over 760 000 acres (310 000 hectares) and involving over 4100 landowners. While the majority of funding comes from the United States, DU is well supported in the province. In 1989, the 99 fund-raising events held by DU in Alberta attracted 10 865 people and raised $1.2 million. The following description of philosophy and activities in Alberta is based on information supplied by DU.

Waterfowl habitat protection and enhancement are the single focus of DU projects. In recent years, DU has expanded its water-based programs to include adjacent upland securement and management, recognizing that suitable upland nesting cover is as important to waterfowl production as the wetland itself. DU's Prairie Care program focuses on protection of upland habitat while promoting sound soil and water conservation practises.

DU projects are designed to provide agricultural benefits as well as waterfowl habitat. Agricultural benefits include flood control and management, livestock watering, irrigation and native wet meadow vegetation management for forage production. Soil and water conservation methods such as rotational grazing, fall seeding of crops and stubble mulching are examples of Prairie Care upland programs.

Ducks Unlimited has specific ideas about what should be included in a wetland management policy for the settled area of Alberta. DU is adamantly against slough consolidation because it considers the shallow water and temporary wetlands lost through consolidation to be vital in attracting territorial breeding pairs. The best consolidation pond cannot compensate for this loss. Other DU ideas about what is essential in a wetlands policy include the following:

- no-net-loss of wetlands,
- removal of all drainage subsidies,
- recognition of wetland values,
- assertion of public ownership of permanent waterbodies,
- enforcement of existing legislation,
- tax benefits for wetland preservation,
- one policy applicable to all departments, and
- comprehensive review of all drainage proposals.

Philosophically, DU is against all wetland drainage and hopes to reclaim many thousands of acres of wetlands that have been lost.

5.1.1 Ducks Unlimited Cooperative Programs

a. Wetlands for Tomorrow. See Section 4.2.3.4 for details. This is a cooperative program with the Alberta Fish and Wildlife Division.

b. Buck for Wildlife. See Section 4.2.3.1 for details. In 1988, approximately $700 000 was committed to DU from the Buck for Wildlife fund towards $1.4 million of new DU projects.

c. Alberta Water Management and Erosion Control Program. See Section 4.2.1.1. DU participates in this government funded cost sharing program when invited either by Alberta Environment or by the local authority (e.g., county or municipal district). In 1988, projects with DU participation received approximately $500 000 in funding. DU typically participates in habitat preservation and development components of these larger flood and erosion control undertakings.

d. Drought Assistance (PFRA). As a result of the recent drought problems in central Alberta, DU has participated in a three-way cost sharing program to construct dugouts adjacent to existing DU wetlands for landowners who are severely affected by the drought. Costs are divided equally among DU, PFRA and the landowner.

e. Public Land Dispositions. DU is presently securing important wetland areas on public land in the northwestern portion of the province. With the assistance of Alberta Fish and Wildlife and Public Lands, Licenses of Occupation (LOCs) with 50 year terms are securing wetlands in this area from possible drainage once the area is opened for development.

f. Cooperative Programs With Irrigation Districts. DU signed a 30-year agreement with the Bow River Irrigation District (BRID) allowing DU to develop a multi-million dollar wetland improvement program within the BRID. DU has also entered into a three-party agreement with Alberta Fish and Wildlife and the Eastern Irrigation District (EID) to develop wetland habitat in the EID.

g. The North American Waterfowl Management Plan. See Section 4.2.5.1. DU is a participant in the NAWMP.

h. Small Wetlands Program. This program was established in 1986 in response to a growing number of landowner referrals for development of small wetlands in central Alberta. Most of the wetlands require no water control, and DU's role has been to improve nesting habitat through the placement of rock islands or floating nest structures and to establish upland management plans. To Over 20 000 acres (9000 hectares) have been secured under this program. The Small Wetlands Program has evolved into the more comprehensive Prairie Care programs.

5.2 Other Active Nongovernment Organizations

5.2.1 Alberta Fish and Game Association

The Alberta Fish and Game Association (AFGA) was founded in 1909 and presently has over 23 000 members. The association is engaged in many activities related to hunting and habitat

enhancement. Between 1984 and 1988 the AFGA received $434 000 from the Buck for Wildlife fund. In combination with volunteer time and effort, the funds were used for construction of nesting structures, habitat development, fencing, tree planting, stream retention and other activities.

The AFGA has two programs for recognition of landowner efforts in maintaining habitat. The Habitat Steward Program has recognized over 85 landowners for retention of 30 670 acres (12 412 hectares) of habitat, while the Heritage Farmstead Program has recognized 31 landowners for the retention of abandoned farmstead habitat. Recognition involves the presentation to the landowner of a sign and wall plaque at a dinner in the landowner's honour, plus an announcement in the local newspaper.

The value of simple recognition programs such as these should not be underestimated. Undoubtedly many landowners wish to be good stewards of the land and providers of habitat for wildlife, and like most people appreciate recognition for their efforts on behalf of society.

5.2.2 Wildlife Habitat Canada

Wildlife Habitat Canada was formed in 1984 with the aim of conserving, restoring and enhancing wildlife habitat throughout Canada. Projects are financed primarily through the sale of wildlife habitat conservation stamps and associated limited edition prints. Wildlife Habitat Canada has contributed to the acquisition and enhancement of over 5 765 acres (2 330 hectares) of habitat in Alberta, and is a contributor to the provincial Landowners Habitat Program (see Section 4.2.3.2).

Wildlife Habitat Canada has contributed to wetland habitat projects throughout the prairies including the Habitat Enhancement Land Use Program (HELP) in Manitoba and the Prairie Pothole Project in Saskatchewan. These programs are discussed in more detail in the following chapter.

5.2.3 The Alberta Recreation, Parks and Wildlife Foundation

The Alberta Recreation, Parks and Wildlife Foundation is a provincial crown corporation which accepts donations and other revenue and provides grants for various projects dealing with some aspect of recreation, parks or wildlife. The foundation is currently providing funding for two significant wetland-related projects. A grant of $10 000 went to W-E-R Engineering for a study that is part of a larger On-Farm Water Management study on land owned by Mr. D. Massey in central Alberta. Another grant of $50 000 was given to Ducks Unlimited to assist with the purchase and development of the Cassils Marsh near Brooks. The foundation is also involved in many smaller projects that benefit all wildlife.

5.2.4 The World Wildlife Fund (Canada)

In 1986, the World Wildlife Fund Canada initiated the Wild West program in the prairie provinces. One of the key elements of this program is the Prairie Conservation Action Plan (World Wildlife Fund 1988). The purpose of the action plan is "to influence policy and attitudes so as to conserve the biological diversity found in the Canadian prairies". The plan establishes a five year set of goals and actions to be implemented by government agencies and private organizations and individuals. The plan states that "every remaining prairie wetland is precious". The Alberta Department of Forestry, Lands and Wildlife has established the Prairie Conservation Co-ordinating Committee to provide advice and facilitate implementation of the action plan in Alberta. A broad

range of federal, provincial and municipal government agencies and non-government organizations are represented on the co-ordinating committee.

Prairie for Tomorrow is another program which originated under the Wild West program. Prairie for Tomorrow focuses on the preservation of habitat for endangered species and includes public awareness programs, preparation of management plans for endangered wildlife, and cooperative projects with landowners for preservation of habitat, including wetlands. Prairie for Tomorrow is a three-year, $600 000 program funded equally by the World Wildlife Fund Canada and the Alberta Fish and Wildlife Division.

5.2.5 The Nature Conservancy of Canada

The proposed National Data Conservation Centre of the Nature Conservancy of Canada is land regions of Canada. The Conservancy has also assisted in the acquisition of the Outpost Wetlands Natural Area in Alberta.

5.2.6 Canadian Water Resources Association and Soil and Water Conservation Society

Both of these organizations are active in promoting information exchange regarding wetland and water management issues. They jointly sponsored two "Wetlands, Wildlife and Agriculture" conferences in Edmonton in April 1988 and February 1989.

5.2.7 Landowner Organizations in Alberta

The Alberta Cattle Commission has taken an active role in promoting the removal of Section 49 of the Wildlife Act and has produced a position paper on the subject (Alberta Cattle Commission 1988). The commission has taken its concerns to the public through the news media. The Cattle Commission position regarding the removal of S. 49 was discussed in Section 4.1.1.7.

The Christian Farmers Federation advocates policies to encourage soil and water conservation, and has shown interest in wetland issues. Unifarm is planning to prepare a position paper on wetlands in 1989. The Alberta Conservation Tillage Association advocates minimum tillage and the maintenance of fall cover. The Alberta Irrigation Projects Association is also active in promoting wildlife habitat enhancement in the irrigation districts.

5.2.8 Others

The Alberta Institute of Agrologists (AIA) recently drafted a set of recommendations on agricultural and water resource issues in Alberta. Recommendations regarding the drainage of wetlands included 1) recognition that a landowner has the right to manage wetlands on private land, that the costs of maintaining wildlife populations rest with society and that farmers are entitled to full compensation for waterfowl crop depredation; 2) incentive programs should be used to encourage wetland management practices that mitigate the negative effects of drainage and 3) integrated planning must be carried out to ensure that off-farm drainage networks are adequately sized to handle future drainage requirements.

The Environmental Law Centre is working on a project to describe the common law and statutory regime that governs wetlands on the prairies. This project is tentatively scheduled for completion in 1990.

Trout Unlimited Canada is a private, nonprofit society dedicated to the conservation and wise use of trout and other coldwater fisheries through the undertaking of habitat restoration and enhancement, research, management and public education. Trout Unlimited recognizes the role of wetlands in maintaining the quality of adjacent flowing waters and is supportive of efforts to protect wetlands. Trout Unlimited develops and provides input to public policy as it relates to fish habitat protection.

Local chapters of the Federation of Alberta Naturalists (FAN) are involved in wetland conservation projects throughout the province. The FAN is represented on the Prairie Conservation Coordinating Committee (see Section 5.3.4) and is actively involved in the protection of natural areas in Alberta. For example, the FAN works with the Wagner Natural Area Society to protect the Wagner Bog west of Edmonton. The FAN is developing a Habitat Steward program to recognize private landowners for their efforts in protecting habitat. Signs would be placed to recognize landowners. The program is expected to be implemented by the summer of 1990.

The Federation of Ontario Naturalists (FON) has been active in wetland policy development both in its home province and nationally. In 1987, the FON sponsored a workshop which brought together landowner organizations, wildlife groups, sportsmen's organizations and others from across Canada with an interest in wetlands. This workshop resulted in the publication of "Wetlands Conservation and Policy in Canada: Recommendations by Nongovernment Organizations" in April 1987. The policy strategies recommended in this publication were:

1) create wetland conservation policies and link those policies to other land, soil, water and wildlife conservation policies;
2) improve coordination and communication among government agencies and non-government agencies;
3) recognize and encourage the role and efforts of nongovernment organizations in wetland conservation;
4) coordinate and rationalize government incentive programs and create landowner incentives for wetland conservation;
5) ensure proper maintenance and management of acquired wetlands;
6) close gaps in knowledge that currently exist in wetland classification, inventory and research; and
7) improve education programs.

6.0 POLICIES AND PROGRAMS IN OTHER JURISDICTIONS

Alberta is not alone in dealing with wetland management and policy issues. Other jurisdictions, particularly the provinces and states located in the prairie pothole region, have dealt with similar issues. It is prudent for Alberta to examine the programs and policies that may be applicable to our situation. This chapter examines policies and programs in the other prairie provinces, the province of Ontario and the United States.

6.1 Other Canadian Provinces

6.1.1 Saskatchewan

A pilot project, called the Prairie Pothole Project was initiated by Saskatchewan Parks and Renewable Resources in 1985. The purpose of this project is to assess landowner acceptance of a variety of options that may be used to secure long-term protection of small, privately owned wetlands and associated upland nesting cover in agricultural Saskatchewan. Expenditures to date total $500 000, of which approximately half has come from Wildlife Habitat Canada. The remainder has been evenly split between the federal government, primarily the Canadian Wildlife Service, and the Government of Saskatchewan, primarily Saskatchewan Parks, Recreation and Culture. A total of 13 550 acres (5 484 hectares) of native habitat with low agricultural development potential have been secured through 10-year licence agreements at an average cost of $4.20/ac/yr ($1.70 ha/yr). An additional 230 acres (93 hectares) of cultivated marginal land has been secured under lease agreements at $30/ac/yr ($12.15 ha/yr).

The Souris River Conservation Authority is working on a final draft of a wetlands policy document in conjunction with the Rafferty-Alameda Dam project.

6.1.2 Manitoba

Drainage in Manitoba is regulated under the Water Rights Act, which stipulates that landowners are free to drain within the boundaries of their land, but cannot release water onto downstream properties. The act has been criticized as ambiguous and inconsistent (Rakowski and Jurick 1988) as well as weakly enforced. The Manitoba government has recently been taken to court by 88 landowners who maintain flooding on their land was the result of upstream drainage and that the province was negligent in the enforcement of this act. In one of the first cases to be tried (i.e., each of the 88 must be tried individually), the court ruled in favour of the flooded landowner. The ability to successfully sue for damages caused by upstream drainage is a very important precedent, not only in Manitoba but across Canada.

Manitoba has recently initiated the Manitoba Habitat Enhancement Land Use Program (HELP) (Morgan 1987b). The HELP program is similar to the Landowner Habitat Project in Alberta. It was modelled after the LHP and was developed with the assistance of Alberta Fish and Wildlife Division and offers a wide range of options to landowners designed to maximize the soil, wildlife and agriculture benefits. Options include leasing, winter wheat production, minimum tillage, rotational grazing and others. Payment rates vary depending upon agricultural potential, and reflect cash rental rates for the area.

Manitoba is currently in the process of developing a Land and Water Conservation Strategy. The first part of the conservation strategy deals with water resources and is available to the public. Wetlands are mentioned in the "conservation" and "drainage" policies of the water resources strategy. The conservation policy objective is stated as follows:

> To conserve and manage the lakes, rivers, and wetlands of Manitoba so that they can continue to provide economic, aesthetic, and environmental benefits to existing and future generations.

Policy under this objective includes the following:

> Soil conservation, wetland retention, and the application of appropriate land use practices shall be promoted by the provision of incentives, not only as essential elements of water conservation and protection, but also as key measures to reduce siltation impacts, downstream flooding and non-point source pollution.

The objective of the drainage policy is "to enhance the economic stability of Manitoba's agricultural community." The policy states that drainage "shall be based on agricultural capability of the area to be drained as well as technical, economic and environmental criteria, taking into account the impact on the farm unit and the surrounding community." Higher priority should be placed on maintenance and reconstruction of drainage systems than on expansion of drainage into new areas.

6.1.3 Ontario

Agricultural land drainage has occurred in Ontario for well over a century. Parts of the Ontario Drainage Act, the law that currently regulates drainage in Ontario, can be traced to statutes from as early as 1835. The basis of drainage law is that landowners have the right to drain their water into an established watercourse provided they do not flood anyone downstream (Webster 1984). A drain may be built if the majority of landowners adjacent to a wetland sign a petition requesting the drain. The cost of the drain is then shared by all landowners in the watershed area.

Ontario has developed an evaluation system for the wetlands of southern Ontario (Ontario Ministry of Natural Resources and Environment Canada 1984) which separates wetlands into seven classes based on the total hydrological, social, biological and special feature values offered by the wetland. Class 1 wetlands having the highest overall value and Class 7 wetlands having the lowest overall value. The classification attempts to provide a measure of overall wetland value. Application of the classification scheme is subjective and may not adequately reflect the true value of a wetland (Ontario Chapter, SCSA 1987).

Ontario published a set of guidelines for wetland management in 1984. These guidelines were very general and included statements such as "Every land use agency should have regard for the implications of its actions on wetlands within its management area" and "Wetlands identified as having significance should be protected from incompatible activities wherever possible." These guidelines applied only to Class 1 and 2 wetlands.

The Ontario Ministry of Natural Resources (OMNR) and the Ontario Department of Municipal Affairs recently issued a wetlands policy statement under the Ontario Planning Act. The policy presents ideas similar to those found in the guidelines; however, the policy is more explicit in the requirement for identification and protection of Class 1 and 2 wetlands. According to the policy, other provincial and municipal public bodies must "have regard" for the wetlands policy unless it is

demonstrated that the policy is not applicable (Wildlife Branch, Ministry of Natural Resources 1988). Drainage or other alteration to Class 1 and 2 wetlands is prohibited. A problem in application of this policy is the reluctance of landowners to consent to classification of their wetlands for fear that they might be Class 1 or 2 and subsequently unavailable for drainage. The policy leaves Classes 3 to 7 wetlands essentially unprotected.

Another recent initiative in Ontario is the Conservation Lands Act passed in June 1988. This act provides for rebates of up to 100 percent of taxes paid on Class 1 to 3 wetlands retroactive to 1987. The act is significant because Ontario generally taxes wetlands at a higher rate than agricultural land and there has been a definite tax incentive to drain these lands.

There appears to be a jurisdictional problem in Ontario regarding wetlands. The evaluation system and the guidelines were produced by the OMNR which has assumed the role of lead agency in the development of wetlands policy. However, administration of the Drainage Act is the responsibility of the Ontario Ministry of Agriculture and Food (OMAF). Conservation Authorities and the Ministry of the Environment are responsible for other water management issues. Furthermore, Ontario's Environmental Assessment Act specifically excludes farm drainage from environmental assessment.

In general, the OMNR has been working to protect wetlands while the OMAF is facilitating drainage. There appears to be a lack of coordination between these two agencies and among the many government and nongovernment organizations that are in some way involved in wetland issues. The adoption of the wetlands policy under the Planning Act may be a positive step in coordinating objectives between departments.

6.2 The United States

The United States eliminated most subsidies for wetland drainage in 1962. The remaining programs, administered through the Agricultural Stabilization and Conservation Service were eliminated in 1977. These programs were eliminated due to pressure from environmental groups and government agencies responsible for wildlife preservation (Leitch 1981).

Under the Small Wetland Acquisition program, the U.S. Fish and Wildlife Service (USFWS) can either purchase a wetland and the surrounding acreage or enter a permanent easement agreement restricting wetland use. A landowner is paid a one-time lump sum for agreeing not to drain land under easement. The landowner retains ownership, but the easement stays with the land when ownership changes. The usual life of the contract is 99 years (Leitch 1981, Heimlich et al 1989). Funds for the program are mainly provided by revenue from Duck Stamps on hunting licences.

In recent years federal involvement in wetland management has occurred primarily through the actions of the following:

1) the U.S. Department of Agriculture (USDA) through the Food Security Act (i.e. "Swampbuster") and the Water Bank; and

2) the Environmental Protection Agency (EPA) and the U.S. Army Corp of Engineers in the administration of Section 404 of the Clean Water Act; and

3) the Department of the Interior, Fish and Wildlife Service through the Endangered Species Act, the National Wetlands Inventory and the Small Wetland Acquisition program.

These federal programs are described below, using information from the Conservation Foundation (1987) and Heimlich et al (1989). Executive Order 11990, which was the first official recognition by government of non-agricultural wetland values, and efforts of individual states such as North Dakota Senate Bill 2035 - "No Net Loss" of wetlands, are also discussed.

6.2.1 The 1985 Food Security Act ("Swampbuster") and the Water Bank

The 1985 Food Security Act contained several conservation provisions of great relevance to wetland management:

1) Swampbuster - discourages the further conversion of wetlands for agricultural purposes by making persons who produce commodities on wetlands drained after December 23, 1985 ineligible for commodity price supports;

2) Conservation Reserve Program - sets aside highly erodible croplands for a period of 10 years. The program is voluntary and payments are established by individual bid;

3) Section 1318 - provides the Secretary of Agriculture with the authority to acquire easements from farmers indebted to the Farmers Home Administration (FHA), which is the U.S. government farm loan insurer, for the purpose of providing debt relief. Payment is in the form of proportional debt forgiveness; and

4) Section 1314 - allows states and private nonprofit conservation organizations to obtain easements on FHA inventory lands.

The "Swampbuster" provision is significant in that it does not make conversion of wetlands illegal. The intent rather is to insure that no federal government programs provide any incentive for wetland conversion. A producer could therefore still choose to drain within the limits of other laws such as the Clean Water or the Endangered Species Acts, and sell his commodities on the open market. For most producers, under current economic conditions it is usually an economic necessity to receive government program benefits. In most cases, the Swampbuster provision would prevent drainage.

Like any program, the Swampbuster provision has certain strengths and weaknesses. The strengths include the following:

1) the dependence of agricultural producers on federal programs increases the likelihood of discouraging drainage; and

2) the provision "denies program benefits" rather than regulating land use. This may be seen as less of an infringement on private property rights.

The weaknesses are as follows:

1) in spite of excellent definitions of "wetland" and "converted wetland", there are still many situations encountered when technical determinations are difficult to make. For example, it may be difficult to determine whether cropping was made possible because of drought conditions or because of prior manipulation. Although maintenance of existing drainage works (i.e., those in use before Dec. 23, 1985) is allowed, it may be difficult to draw the line between ditch maintenance and ditch expansion (Kempf 1987).

2) the act includes an exemption for drainage projects which "commenced" prior to December 23, 1985. A project is defined as "commenced" if groundwork has begun or if "substantial funds" have been committed in a contract for drainage works. This provision most likely had the effect of creating a rush on drainage prior to the implementation of the act. The extent to which this is true is unknown.

3) the large number of small wetlands on hundreds of thousands of farms may make it difficult to ensure compliance.

One other purpose of the Swampbuster provision is to curb production of surplus commodities (Baron and Nomsen 1988). Mitigation or other actions to replace habitat lost to drainage are not an option under "Swampbuster," since commodity production would not be reduced under that scenario. The Food Security Act expires in 1990 and the United States federal government is working on a new farm bill which is expected to have provisions similar to swampbuster.

The Conservation Reserve Program (CRP) could have significant benefits to wetlands and wildlife due to the restrictions placed on reserved lands. The program has been suggested as an alternate source of funds for farmers who have had drainage curtailed by Swampbuster (Baron and Nomsen 1988). Under the plan, farmers can contract with the USDA to remove highly erodible land from crop production for 10 years. In return, farmers receive initial federal assistance in establishing protective soil cover of grass or trees and annual rental payments for the term of the contract. The CRP has the potential to conserve buffer areas around wetlands. Currently 28.2 million acres (11.4 million hectares) are enrolled in CRP, with a goal of 40 million acres (16.2 million hectares) by 1990. Initial expenditures on the CRP total over $2 billion per year.

Section 1318 of the Food Security Act has not been implemented but it has great potential to help financially troubled farmers indebted to the FHA. Section 1314 allows states and nonprofit conservation organizations to obtain easements on FHA inventory lands. Both of these sections should have the effect of providing permanent protection to some wetlands.

The Agricultural Stabilization and Conservation Service of the USDA administers the Water Bank program to protect wetlands (Heimlich et al 1989). The Water Bank provides funds for ten year agreements between the USDA and landowners. In return for an annual per acre payment, landowners agree to protect enrolled wetlands and surrounding upland areas. As of March 1989, 493 000 acres (200 000 hectares) of wetlands and surrounding upland were protected under 4366 contracts. For 1990, $8.4 million has been allocated to the Water Bank allowing enrollment of 160 000 acres (65 000 hectares) of wetland and 350 000 acres (142 000 hectares) of upland (Heimlich et al 1989).

6.2.2 Section 404 of the Clean Water Act

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waterbodies, including wetlands. When it came into force in 1972, it was not widely perceived as a wetlands protection program, although subsequent judicial interpretation and program implementation indicated that Section 404 may be used for that purpose. It has since become the basis for the wetland protection activities of the EPA. In 1986, the EPA set up an Office of Wetland Protection partly to develop policy about Section 404.

There is disagreement on the effectiveness of Section 404 for wetland protection. Although a permit would be required for a farmer to convert a wetland area to upland cropping (Conservation Foundation 1987), this would not be the case if the conversion could be done without discharge of dredged or fill material. The Office of Technology Assessment (1984) reported that only 20 percent of wetland losses are regulated under Section 404. The National Wildlife Federation (1987) considers Section 404 to be a "dismal failure" in protecting wetlands.

6.2.3 Department of the Interior Activity - The Endangered Species Act and the National Wetlands Inventory

The Endangered Species Act protects the habitat of endangered species from federal actions that would jeopardize the continued existence of those species. The act requires all federal agencies to consult with the Fish and Wildlife Service to ensure that actions they authorize, fund or carry out do not destroy critical habitat. The act does have some "teeth" in that if an endangered species is jeopardized the habitat must be protected regardless of other economic or social factors. The principal weakness of the act is that it does not apply to private actions that do not require federal authorization.

The act also prohibits "taking" of endangered animals and defines taking as to harass, harm, hunt, shoot, wound, kill, trap, capture or collect. This could mean that any habitat destruction that causes harm to an endangered species is prohibited. Proof of this type of violation would require that a dead animal be directly linked to the habitat destruction. This type of direct cause and effect would be difficult to prove in a court of law.

The National Wetlands Inventory was established to generate and disseminate scientific information on the characteristics and extent of wetlands, and to make this information available to individuals, industry, universities and all levels of government. Over half of the United States has been covered by the inventory. Over 100 uses have been identified for the information on the inventory maps. One example of their use is in assisting Soil Conservation Service personnel to help farmers comply with the Swampbuster provisions of the Food Security Act. The principal weakness of the inventory is the inability to produce updated maps where products have become outdated.

6.2.4 Executive Order 11990

Executive Order 11990 was signed by President Carter in 1977. An executive order is somewhat analogous to an order-in-council in Canada. Although it has no specific program implications by itself, it is significant in that it was the first official federal recognition of wetland values other than agriculture and wildlife. The order directed federal agencies to consider factors such as maintenance of natural systems, species and habitat diversity and recreational, cultural and scientific uses of wetlands when carrying out activities that may affect wetlands.

6.2.5 State Involvement

The Clean Water Act has provisions for individual states to assume responsibility for a portion of the permitting processes of Section 404. Michigan is the only state that has opted to do this. The primary reasons for states not participating include lack of funding and restrictions on the number of waterbodies turned over to state control.

There is considerable latitude for individual states to devise their own programs regarding wetlands. In 1987, North Dakota passed Senate Bill 2035, which had provisions for a policy of "no net loss" of wetlands to be implemented in 1989. Part of this legislation included the establishment of a "wetlands bank" with debits and credits for drained and restored wetlands. Permits for drainage are granted only if the following conditions are met:

- the individual wishing to drain pays at least 10 percent of the cost of restoring an equivalent wetland;
- other entities (e.g. state or federal governments and private organizations) pay the remaining cost of restoration or replacement; and
- someone is willing to restore wetlands on their property or the wetland bank is no more than 2500 acres (1000 hectares) in the hole (Leitch 1987).

The "no net loss" provision has been criticized as being unfair in areas with low land values where wetlands would be created inevitably (i.e., rich areas would get richer and poor areas poorer as wetlands were redistributed) (Moore 1987). Other analyses suggest the economic impact of Senate Bill 2035 will be minimal (Leitch 1987).

Other states have proceeded with wetlands initiatives. Examples are Minnesota's "wetland bank," New York's very advanced and expensive wetlands rating and valuation system, Michigan's "tip of the mitt" program and many others. In Alaska, most municipalities have wetland management plans. At the same time there has also been a reluctance by state governments to accept federal programs that may not reflect the desires of their constituents. The North Dakota government was fairly hostile toward federal wetland preservation programs until recently (Sayler et al. 1984). In the past, North Dakota has resisted federal land purchases for conservation probably because increased federal ownership of land was unpopular with the residents of that state.

6.2.6 The National Wetlands Policy Forum

The nonprofit Conservation Foundation convened the National Wetlands Policy Forum in 1987 at the request of the EPA. The 20 members of the forum included state governors, legislators, and heads of state agencies; a town supervisor; chief executive officers of environmental groups and businesses; farmers and ranchers; and academic experts. Public workshops were held in 1988 throughout the United States and in the fall of 1988 the forum issued its final report and recommendations Protecting America's Wetlands: An Action Agenda (The Conservation Foundation 1988).

The forum made recommendations about protection of the wetlands resource, improvement of the management process and program implementation. Among the key recommendations were the following:

- work towards no net loss of wetlands, with a long-term goal of increasing the quantity and quality of the wetland resource base;

- provide better incentives to private wetland owners for protection of wetlands;

- expand government and nongovernment acquisition and protection programs, and reduce wetland losses resulting from government programs; and

- institute regulatory programs to ensure that all wetland conversions are subject to review.

Many other recommendations concerning a range of topics such as restoration of wetlands, regulatory processes and delegation of authority to states were included. It was recognized that implementation of the recommendations will require a significant increase in resources for wetland protection and management. The recommendations have been endorsed by President Bush.

7.0 DISCUSSION OF AVAILABLE POLICY TOOLS

7.1 Different Viewpoints on Policy Direction

In this section, wetland management is discussed from several different perspectives. Possible approaches to a wetland management policy for the settled area of Alberta and supporting reasons for each approach are provided. These are theoretical explorations of various options for a wetland management policy and are not policy recommendations. The pros and cons of various policy tools are highlighted.

A major problem in developing wetland management policy is that property rights regarding wetlands are not clearly defined. Wetlands traditionally have been considered as part of a landowner's holdings to be managed as the landowner sees fit. The ownership of a wetland is dependent ultimately on judicial interpretation and government policy regarding the Public Lands Act and the definition of what constitutes a permanent waterbody. There are limitations on what can be done to a wetland regardless of ownership. Even if a landowner clearly holds title to a wetland, drainage is subject to licensing under the Water Resources Act.

Landowners probably will want to maximize the economic returns from their land. There will be a desire to maximize the returns gained from wetlands if the landowner feels he or she owns them. This often results in drainage. Farmers are paid for the products of a drained wetland, but not for the products of a retained wetland.

From a farm financial standpoint drainage of nonpermanent wetlands is usually viable economically (Alberta Water Resources Commission 1987). Even when not economically viable, drainage may still be desirable for personal or social reasons. A farmer may dislike manoeuvring around a wetland or may feel social pressure to have "clean" fields. Leitch (1983) found that farmers in Minnesota drained even when present value of the expected net return from drainage was only 10 percent of the cost of drainage. He surmised that the nuisance value of wetlands was very high. The farmer was willing to pay a considerable amount for the convenience of not having to farm around wetlands.

Drainage is rarely economically viable from a societal standpoint, due to costs of erosion control, wildlife losses, flooding and the possible loss of other unknown or poorly understood benefits. Society has noneconomic reasons for desiring wetland retention as well.

Given the scenario of unclear ownership of wetlands, a desire among farmers to drain, a desire by society to retain wetland values and a general lack of market mechanisms to pay landowners for the values produced by retained wetlands, what do we do? Some of the potential management options are outlined below.

7.1.1 Elimination of Subsidies For On- and Off-farm Drainage Costs

For most farmers, drainage would not be economically viable if they were asked to pay the costs of outlet works, downstream erosion, flooding and other associated off-farm drainage costs in addition to all on-farm costs. This would be true particularly in areas where flooding or erosion control costs are very high.

7.1.2 Incentive Payments For Wetland Retention

In order to preserve wetlands, society could pay landowners not to drain, or, stated more positively, pay the landowner for making available the benefits of a retained wetland. This approach makes two key assumptions: 1) the property right to a wetland lies with the landowner (i.e. the landowner has the right to drain but chooses not to because of the incentive); and 2) the value of a retained wetland to society is high enough to justify infringing on the rights of landowners to do what they want with their property. Acceptance of the first assumption depends on the interpretation of the Public Lands Act (see Section 4.1.1.5 of this report). The second assumption is a political choice based on an assessment of quantifiable economic benefits arising from wetlands (e.g., hunting, trapping and forage) as well as the noneconomic values of wetlands.

In the past, the benefits of drainage to society were perceived to be greater than the costs, primarily because of the economic benefits gained through increased agricultural productivity allowed by drainage.

One criticism of paying someone not to drain is that there is no way of determining the intent to drain other than relying on the honesty of landowners. Some landowners would undoubtedly be paid not to drain lands that they had no intention of draining in the first place. If society attaches value to wetlands, it should be willing to pay regardless of the intent of the landowner. Payment is for the benefits of the retained wetland, not compensation for inconvenience or the value of a lost crop.

7.1.3 Increased Regulation

It could be argued that because of the benefits to society of wetland conservation there should be restrictions placed on the landowner's rights to drain. Restrictions are placed on other actions that harm public resources, such as air and water pollution, and restrictions could be placed on wetland drainage that may harm public resources, such as wildlife and water quality.

The question of property rights is central to this approach, also. Is a landowner's control over the land complete or does the public have some say over land use decisions? We have seen that complete control by the landowner is not desired by society. For example, the Soil Conservation Act ensures that soil resources are not degraded through poor management. That act places the responsibility for proper management on the "landholder" and resorts to charges and fines only after exhausting all other methods of compliance. This illustrates the public desire to minimize infringement on the property rights of landholders. Another example where restrictions are placed on the activities of private landowners for the overall benefit of society is development control under the Planning Act.

There are disadvantages in relying heavily on regulation to control land use. There is a political cost associated with taking away property rights. Also, regulation requires enforcement and punishment, both of which are expensive.

7.1.4 Increased Awareness of Wetland Values

The level of public awareness of wetland values could be elevated through education. This could result in greater support for wetland management programs among society. If landowners were

informed about the positive aspects of wetlands both to society and to their individual operations, the desire to drain may be reduced.

7.1.5 Tie Retention of Wetlands to Eligibility For Other Subsidies

The cross-compliance components of the "Swampbuster" provisions in the 1985 United States Farm Bill make the receipt of any or all agricultural subsidies contingent upon the adoption of certain specified land management practices, including the retention of wetlands. This approach does not regulate actions. Instead, it denies program benefits. Landowners are free to do as they wish within the bounds of other restrictions. However, if they want to participate in public programs they must comply with the government's rules.

Given the widespread dependence on agricultural subsidies, this approach would have much the same impact as a regulation. The key difference would be that landowners would retain the right to do as they wish regarding drainage within the limits of other restrictions. To most landowners this would be little consolation if faced with the prospect of a large loss of program benefits, at least under current economic and commodity price conditions. If prices were to rise significantly, this type of approach could be rendered ineffective.

7.1.6 Large-scale Land Purchase by the Crown

One way of securing wetlands would be for society, through governments, to purchase wetlands and then manage them as it sees fit. The advantage of government purchasing wetlands is that the former landowners are compensated for their loss of property rights. The question of property rights is also central to this approach. As the new landowner, the government has virtually unlimited rights to manage the wetland to produce societal benefits.

There are disadvantages to taking this approach to the extreme. First, the cost would be prohibitive not only for wetland purchase but for subsequent management and administration. Second, there is no guarantee that government will be a better manager than the previous owner. Finally, there is the question of the political suitability of large-scale land purchase (Morgan 1987a).

7.1.7 Adopt a Free-enterprise Approach

Another possible approach to wetland management is that of unregulated free enterprise (i.e., laissez-faire). Under this system landowners would bargain with other members of society for certain wetland benefits. People with specific uses for wetlands such as hunting, bird-watching, trapping or aesthetic enjoyment would pay the landowner for the opportunity to pursue their activities. The landowners would then have an incentive to make their wetlands more attractive to these groups since there would be competition among landowners to attract paying users to their wetlands. Conversely, the various user groups would have to pay enough to the landowner to make preservation worthwhile.

Although this system has the benefit of transferring the economic benefits of preserving wetlands directly to landowners, there are numerous problems. One problem was noted in Chapter 4 in the discussion of Section 49 of the Wildlife Act. The landowner who receives payment for hunting on his or her land may not be the same landowner who provided the necessary spring rearing habitat, or for that matter the fall habitat for the wildlife that are harvested. Some kind of group action by hunters to pay for rearing habitat would be necessary. Although this approach is evident in organizations such as Ducks Unlimited, this type of action would probably not work on a wide scale

for other values such as groundwater recharge. Some public resources are available to users at no additional cost and it would be difficult for the private sector to compete.

8.0 RECOMMENDATIONS

In Chapter 3, the following provincial government management objectives for wetland resources were stated:

a) Maintenance of long-term agricultural productivity including conservation of soil resources.

b) Maintenance of ecological values.

c) Maintenance of heritage values.

d) Maintenance of peat resource values.

e) Protection of private and public property and public safety.

f) Maintenance of recreational and tourism opportunities.

g) Maintenance of a sustainable supply of high quality groundwater.

h) Protection and improvement of surface water quality.

i) Retention of wildlife habitat and maintenance of wildlife populations.

The need for development of a wetland management policy for the settled area of Alberta was apparent in light of the following concerns:

a) There has been a significant loss of wetlands in the settled area of Alberta.

b) Different types of wetlands with different values are found on private and public land throughout the settled area of the province.

c) The costs and benefits of wetland drainage and retention are distributed unevenly among landowners and society as a whole.

d) Albertans are generally unaware of the many benefits of wetlands and are often unaware or indifferent to the loss and degradation of wetlands that result from human activities.

e) Drainage is attractive to many agricultural producers.

f) Programs offered by government departments and nongovernment organizations often appear to conflict in purpose with respect to wetlands.

In addition, it was noted that a wetland management policy should be guided by the following principles:

a) Integrated management of wetland resources is desirable.

b) The interests of individual landowners and Alberta society as a whole must be considered.

c) Existing legislation, policies and programs of the various government departments must be considered.

d) Society has some responsibility to assist in the protection of wetlands on private land.

e) Wetland management and conservation require the cooperation and support of federal, provincial and municipal governments and private individuals and organizations.

8.1 Policy Recommendations

In light of these objectives, concerns and principles and considering the background information contained in the body of this report, the following draft policy for management of wetlands in the settled area of Alberta is proposed for public discussion. **The final policy will reflect public comments and should be consulted when it becomes available.** The draft policy is in two parts - first, a general statement of principle; second, a series of strategies for planning, education, management, program delivery and legislative review regarding wetlands. As a general statement of principle, the following is proposed:

> **The Government of Alberta will ensure the conservation and management of wetland resources in the settled area of Alberta to sustain the agricultural, environmental, economic and social benefits that wetlands provide.**

The following series of strategies for fulfilment of this policy are intended to guide provincial government departments in the delivery of programs affecting wetlands. The strategies are proposals only and are not all inclusive. Elaboration and refinement of the strategies are required.

Plannning Strategies

1) Conduct inventories of the settled area of Alberta to determine the distribution, type, condition and status of wetlands in support of wetland management planning.

2) Establish objectives for wetland management in the settled area. Existing river basin, integrated resource, and municipal planning programs may assist in establishing wetland management objectives at appropriate scales.

3) Variability in the type and distribution of wetlands throughout the province must be recognized when wetland management objectives are being developed. Different management strategies may be required in different areas of the province.

Education and Awareness Strategies

1) Emphasize the benefits of wetlands to governments and landowners, and encourage management of wetland resources that will provide multiple benefits.

2) Emphasize the benefits of wetlands to all Albertans.

Wetland Management Strategies

1) Drainage of permanent slough/marsh wetlands should not be permitted.

2) Financial and other incentives should be provided to landowners to maintain nonpermanent wetlands and wetland margins in accordance with management objectives.

3) Management of nonpermanent wetlands may include controlled drainage if regional wetland benefits are sustained.

4) Public lands containing significant wetlands should be maintained in public ownership. The provincial government should consider the option of purchasing or leasing private land that has significant wetlands or wetland margins that are associated with flooding.

5) Consideration should be given to creation, enhancement or use of wetlands as water management tools for the purposes of flood control, water quality improvement or regional wetland consolidation.

6) A more complete understanding of wetland functions and processes is necessary for effective management. Research priorities concerning wetland management should be identified.

Program Delivery Strategies

1) Government departments should ensure that programs directly or indirectly affecting wetlands are consistent with this policy.

2) Government departments should be aware of intergovernmental programs, and those of nongovernment organizations and private individuals, that may have an impact on wetlands. Furthermore, these departments should support and encourage consistent and complementary activities.

Legislative Review Strategies

1) All legislation affecting management of wetlands should be reviewed to ensure consistency with approved government policy.

2) Any legislative change required to implement an approved wetlands management policy should be determined.

8.2 Conclusion

The draft policy for management of wetlands in the settled area of Alberta will be distributed for public review during the summer and will be discussed at public meetings in the fall of 1990. After public review, all public comments will be considered by the Alberta Water Resources Commission and the interdepartmental committee that prepared the draft policy. A summary of public comments will be forwarded with a recommended policy to Cabinet for consideration. If approved by Cabinet, the document will become provincial government policy for the management of wetlands in the settled area of Alberta. It will be implemented through the actions of provincial government departments and will be considered whenever decisions that affect wetlands in the settled area of Alberta are made.

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